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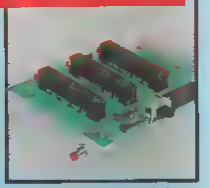

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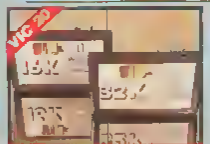

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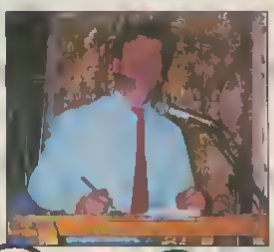
Above Ghostbusters II, page 60



Above Computer Musicians page 55

Left. Flame On, page 70

Above Altered Beast, page 24

THIS MONTH'S PROGRAMME

FEATURES

REGULARS

GAMES

DE GEEZER TALKS...

Hell rumbled growled and poured through small cracks in the pavement It grew expanding into a large, horrific monstrosity lining the skyline and blotting the sun It had a site and a name The site was Earls Court Its name was "PC Show"

I would like to take this opportunity to thank companies and freelancers for making my PC Show this year slightly better than being roasted on the spike of eternal pain (as it was last year) It wasn't a mammoth event but at least my clothes weren't singed

Those who haven't noticed this is our Christmas issue (and what an issue), but I think I'll use the rest of this space to promote the next issue, it certainly deserves promoting

As from next month YC will be a different magazine to the one that we have all become used to over its five years of existence One major move is the inclusion of a free cassette every issue, full of games, games, and more games The interior will change in content too Your Programmer will depart (alas alack, and other words beginning with ala), but to replace it will be an abundance of new regular columns

There will be new staff too, to make sure our games coverage will be the most up-to-date available, with tonnes of hot exclusives So make sure you've got an order with your newsagent now we wouldn't want you to miss out now would we?

Rik Henderson

All the staff wish our readers a splendiferous Christmas

Above Sometimes we go too Ferrari!

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Deputy Editor *Richard Henderson*
Technical Editor *Paul Eves*
Group Editor *Stuart Cooke*
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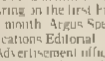


PC Show 1989

This year's *PC Show* was a gross disappointment for the record crowds that turned up to be stunned by the industry's Christmas fare As each year goes by, more companies are abandoning the principle of showing computer games and getting hooked on cramming as many arcade machines into their smaller and smaller stands

Ocean had an impressive position which formed the entrance to the leisure section of the hall Fronted by two Fifties Cadillacs the main feature was a video wall showing forthcoming attractions, including *The Untouchables*

US Gold's crowd pleaser was an Outrun Ferrari, while *Mindscape* went for an early Harley Davidson was this the alternative Motor Show?

Without a doubt the show-stealer was *Domark's Hard Driving*, a strong tip for the Christmas number one This conversion of *Tengen's* coin-op has the added attraction of an action replay which allows you to relive the moment the car crumpled The stunt track is particularly exhilerating

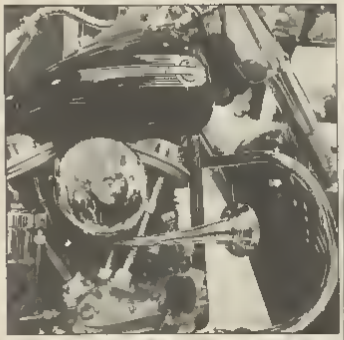
This year the leisure section couldn't fill the area allotted to it Many of the big players were either missing or represented by minimum-area stands Where were *Mirrorsoft Alternative* or *Code Masters?* You could be forgiven for missing *Microprose's* stand which could have been set up in a telephone booth considering the size of the company it was an insult to their customers Perhaps the booth was meant to attract attention to the company's take over of *Telecom* At least *Activision* had a few *Ghostbusters* doing the rounds

I think the effect of the whole Show could best be seen by the way the massive crush at lunchtime thinned out before mid-afternoon and almost emptied an hour before the event closed

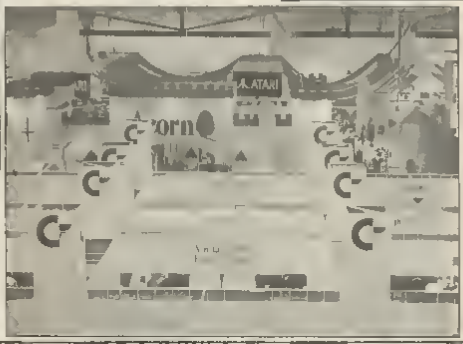
Proof that there was nothing there to keep them interested

DATA

Below: Show me a show and I'll show you a show



Below: The PC Show, an exhibition with more computers than a particularly well-endowed missile silo. Commodore were there, so were US Gold but both were ever shadowed by the Iari



Show Wars

Who would have thought that this year's PC Show would be the last? Come to think of it, it *was* rather like a wake. Some of the glitter of its past glory was still there but it was as tarnished as last year's tinsel.

In the days when the event was known as the *Personal Computer World Show*, named after a magazine of the same name (in fact, both show and magazine were conceived in the Troubadour, a coffee house close to Earls Court) it was sponsored by publishers VNU. At this year's Show a leaflet appeared, from a different publisher advertising an event called *The European Computer Entertainment Show* which is booked into Earls Court for 13-16 September 1990 – the exact date of the next PC Show.

The question goes begging: what will happen to the PC Show? Has it disappeared without trace or will it still go ahead on another date or at a new venue? VNU has gone awfully quiet but maybe that's a sign that something's going on behind the scenes.

Judging by the poor showing within the entertainment section at this year's show the new ECE Show could have problems even before it starts.

DATA

King Hell

Demonic is the only way to describe Rik Mayall's performance at *US Gold's 1 IP* sideshow Every day after the Show closes the exhibitors hit the town for various alcoholic trophies There's usually one event that stands head and shoulders above the others and this year it was US Gold's turn

The select 'assembly at London's *Limelight* club were treated to a preview of US Gold's latest video (yawn) after which company boss Geoff Brown announced a personal appearance by Michael Jackson Not THE Michael Jackson but a moonwalking clone from Deptford

Then the Hallelujah Chorus hailed the appearance of the night's star turn Nothing happened Then the music reached a crescendo once more and amidst a series of thunderflashes Mayall appeared with his hair laquered up into two long horns He then proceeded to prove what a horny little devil he is with an act which was liberally sprinkled with words that would remove him from any bulletin board in the country The performance was superb though it still needs to be tightened up to give maximum impact Willy jokes and swearing are more the preserve of Bernard Manning than the laughing stock in trade of an alternative comedian

If I remember nothing more about the Show it will be US Gold's evening treat

Above Rik Mayall Michael Jackson and Geoff Brown all of which exercising their own brand of humour

Whet's the score?

Microprose boss Major (Wild Bill) Stealey had a lot on his mind during the Show Frantic nocturnal phone calls to the States as much as four times a night Was the company going down the john? Had the Russians attacked Microprose HQ? Surely some disaster had beset the company But no his frantic calls related to his second greatest obsession, baseball! All he wanted was to keep up with the action as it happened

Microprose's *Rainbow Warrior* has upset one of Greenpeace's international divisions Company PR man Martin Moth, couldn't remember whether it was Belgium or Scandinavia but the game without sanction is therefore banned It appears that a magazine is now running a campaign to get Greenpeace to sanction the game so that it can be released

This is a new situation for Microprose, normally its game get banned in certain countries because of their warmongering scenarios To balance this they've entered the peace market and consequently get banned

Make or Break

Would-be games machine manufacturers *Konix* seem to be getting plenty of support from the software industry but the Show leaves a couple of questions unanswered Considering the Konix Christmas push will start in November, it would be expected that everything would be up and running on the Konix stand Well everything was up the games the novel controller and the large frame to mount everything on The problem was that only the games were running

Nowhere was there a finished, fully working and fully visible machine The machines that were working were hidden in wooden boxes and controlled by conventional joysticks The machine frames on display were apparently no more advanced than those on display in the early part of this year No journalist has seen the fully working machine as close scrutiny of any article will show

If the Konix was going to be a success this year it should have been seen in all its glory What happened? The company has had a year to get it right are rumours of financial and technical problems correct? It's about time Konix boss, Wynn Holloway, came clean All will become clear in November

Utterly Deft

Every year companies will try to attract the punters with personal appearances by showbiz personalities To say that the high point was Timmy Mallet on the Atari stand gives some idea of the depths of in(s)anity that the Show has now reached

As a crowd puller, Atari's coup worked Timmy showed how utterly utterly brilliant he is at beating kids on computer games and wearing those whacky outfits that will ensure that he never wins the best-dressed man of the year award

DATA

Above Wet no free software.

Above I'm putting on my top hat!

One Good Nurd...

Who were the pillocks in the S**t on FAST' t-shirts? Why not wear a shirt that says Kill the industry' What nurds

In case you don't known *FAST* is the *Federation Against Software Theft* whose primary aim is to prevent the organised ripping off of software

To turn up for an industry show while wearing a provocative slogan is just asking for trouble We hope they found it

Novagen's Damocles

Though absent from the Show, *Novagen* is about to release *Damocles*, the sequel to the magnificent *Mercenary*

Damocles was first previewed as a demo at the PC Show in 1987, since which programmer Paul Woakes has been working hard to get the 3D flight game off the ground In the game, the comet damocles is heading towards the planet Eris By exploration the player has to discover the necessary objects to prevent the disaster

The release date is definitely pre-Christmas and at £24 95 for the Amiga it could be a surprise Christmas hit

Programmers Unite!

The *Society of Software Authors* (SSA) stand attracted a steady trickle of programmers, graphic artists musicians and games designers who were curious to know what it was all about

The SSA has been founded to serve the needs of professional software authors by giving advice, helping with problems and generally turning the rag tag industry into a professional body Full membership costs £150 and is open to any author who has had at least one title published For unpublished novices, the annual subscription is £50 for associate membership Amongst the societies benefits are business guidelines to help with VAT, solicitors and money chasing, plus the excellently informative newsletter full of news, warnings, and professional equipment (hardware and software) reviews

According to Mev Dine, director of *Vivid Image Developments* and SSA member, the society has already attracted some of the big names in the industry but there's always room For more Further details can be obtained from the SSA, 6 Callow Croft Burbage, Wiltshire SN8 3TB

Above The Level 9 fat cats

Levelled Out

Britain's senior adventurers, *Level 9 Computing*, is pulling out of the adventure market after the release of *Scapeghost*

According to L9 designer, Pete Austin, 'People have been declaring the death of the adventure market for years so Scapeghost is an appropriate final release It comes from beyond the grave '

The company has been producing adventures since 1981 and it is sad to see them go Perhaps part of the problem lies way back when *Melbourne House* produced *The Hobbit* and took the software market by storm L9 resisted following the new style of adding graphics to adventures a concept pioneered by *Sierra Online* many years earlier Since then *Magnetic Scrolls* has further advanced the popular adventure while L9 has maintained the opposing view that complexity of gameplay is the main thing

Whatever the reason for the move, we thank Level 9 for hours of fun and we look forward to their new venture as an arcade-style games company using their new development kit, HUGE, for 16 bit programming

THE BIG AND WOBBLY BUDGET COLUMN (OOER!)

Five cheapies on the new ENCORE label. Are they raves from the grave or should they be buried for ever? Gordon Hamlett takes a look

KOKOTONI WILF

This is the oldest of the six titles dating back to 1984 which in terms of computer games, makes it practically a museum piece. The great magician Ulrich has discovered that there is an object in existence of such great power that he must posses it. Unfortunately the fragments of the Dragon Amulet are scattered through the fabric of time itself and Ulrich is an old man.

Enter Wilf his protege who have been charged with recovering the various fragments for your master. The only help that he can give you is to fix a pair of wings to your back allowing you to fly over the many hazards.

The game is divided into several time zones and you have to find a way through the cave system collecting bits of the amulet until a time gate appears transporting you to another period of history.

The game involves little more than moving round the screen, avoiding bumping into the many obstacles. There isn't even any combat to keep you on your toes. Wilf is definitely beginning to show his age now. Everything about it is crude, the graphics, sound and gameplay. Unless you happen to be a nostalgia freak you would probably do best to give this one a miss.

INFO

Overall:
28%

BOMBJACK II

Imagine PacMan crossed with a platform game and you will have some sort of idea of what Bomb Jack II is all about. There are forty different screens – split between a reptile infested lava pit and outer space – each consisting of a number of platforms. On these platforms are a number of bombs to be collected but inevitably, they are protected by patrolling monsters.

Jack has to find a route round the platforms either dodging the baddies or repeatedly stabbing them until they disappear from the game. Wait too long and the lizard men in their various incarnations leave their regular patrols and start chasing round the screen. There are bonuses to be collected if you manage to defuse all your bombs in the specified order.

Unlike the original game, you cannot leap willy-nilly round the screen. Instead, you can only move sideways onto a platform on the same level, or up and down to one immediately above or below you. This means that not only does your timing have to be pretty good, but you also have to pay considerable attention to your intended route.

As far as the game goes, that just about sums it up. Despite some fuzzy graphics Bomb Jack II is highly addictive and, if the sequel is not quite as good as the original- this is definitely the

best game in the collection and well worth considering

INFO

Overall:
77%

STORM WARRIOR

This is the only game of the five previously unreleased, so the Encore label is something of a misnomer but never mind You are the Crown Prince of your Kingdom and as such are expected to rescue the land from a Wicked Witch's curse She has summoned a violent thunderstorm destined to last for one hundred years unless you can do something about it.

Your ultimate aim is to find the witch's castle and destroy both her and the undead forces she commands Before that final encounter you must battle your way through a forest, fighting off warriors and dinosaurs The instructions don't actually tell you how to accomplish this you must find out by trial and error although the moves are a fairly familiar assortment of somersaults, kicks and swipes with your sword

Timing in the combat routines is not particularly important but where you stand on the screen is If you stand too close to an opponent, you will miss him no matter how good your swordplay is Kick him a few times to make him back off a bit

Storm Warrior is not in the top division of beat-em-up games The animation is poor and the battles lack the realism and excitement that would put them in the top league An average game but then you get what you pay for

INFO

Overall:
44%

TURBO ESPRIT

"Race your Lotus Esprit round the city chasing drug barons" claims the blurb It is only when you get behind the controls of your car that you discover that it handles more like a Model T Ford as it chugs along

Four smugglers' cars and an armoured vehicles are at large somewhere on the city's streets and it is up to you to find them You must then take them out by either blasting them or continually bumping into them until they surrender There are pedestrians and other innocent cars to avoid if you don't want to incur penalty points and you can also write your car off by driving into a brick wall My favourite bit though is that you have to stop for traffic lights! Imagine it, a high speed chase, guns blazing and the lights suddenly turn to red Do you really believe that everybody is going to stop and wait for them to turn to green again?

There are four cities to choose from, each laid out in typical American grid formation You can call up a map to show your location as well as that of the enemy cars Messages inform you that the armoured car has just been spotted on E19 or whatever The problem is that you have to wait ages before you actually arrive on the scene The balance of this game is all wrong

Dreadful graphics, control and gameplay only serve to emphasise the faults inherent in Turbo Esprit I didn't like it when it was first released and things have not improved with time

INFO

Overall:
23%

DEEP STRIKE

The war in the skies over Europe in the First World War was supposed to be the last combat arena where chivalry played its part Pilots frequently saluted each other before duelling to the death and it was not the done thing to gun down an opponent who had run out of ammunition

Deep Strike quickly dispels all the myths! You are a single fighter pilot trying to escort four bombers on a vital mission Pitted against you are the massed forces of the German Air Force Von Richthofen himself, the Red Baron together with his squadron of triplanes Then there are all the barrage balloons and some decidedly anachronistic tanks and field artillery all trying to blast you out of the skies

You can climb, dive and bank as you try to avoid the enemy You have no sights on your plane so all shooting amounts to guesswork. That is if you want to shoot in the first place You have a decidedly small amount of ammunition and should you decide to defend yourself to any great extent, you will find that you have run out of bullets before you are half way to your target

This is a below average shoot-em up and doesn't offer a great deal in the way of lasting appeal If you are looking for this sort of World War One flying game, look out for a copy of Blue Max, the old US Gold game which is infinitely more playable

INFO

Overall:
39%

PREVIEW

IT'S ALL IN THE MINDSCAPE

Roll up, roll up, all the fun of the fair. Well, not exactly fair, but a circus. Everybody is there, under the big top for what should be the greatest show on earth.

There [illegible] your [illegible] a different [illegible] juggling knife throw[illegible] tight-rope walking, [illegible] high diving and human cannon-ball when you discover that someone is trying to sabotage your act.

Fiendish Freddy is out to get you. Who has employed him nobody knows but he is definitely out to make your life a misery. Little things give it away such as waiting until you are sitting on your unicycle juggling such diverse objects as knives and babies before throwing you a bomb. And who is it who tries to hit you on the hand with a hammer when you are hanging on to a rope for dear life?

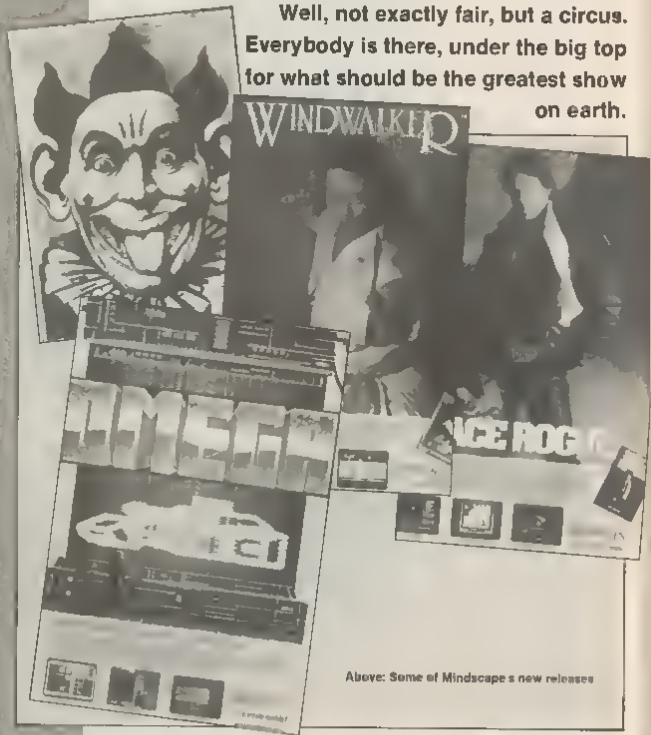
The graphics in **Fiendish Freddy** are superb — very high quality animated cartoons. If the idea of a custard pie in the face makes you fall about laughing this could be just the game for you.

On a completely different track, *Mindscape* are now responsible for *Origin's* [illegible] in this country and there are three new titles forthcoming on that label. **Windwalker** is a successor to **Moebius** the Oriental fantasy role playing game that combined strategy with arcade beat up up action. This time you must build up your character from that of a humble fisherman to martial arts expert.

Omega sees you trying to design the battle tank of the future. Apart from testing your creation in various battle simulations you must also strive to introduce artificial intelligence into your latter day leviathan. The final game of this trilogy is **Space Rogue** a science fiction role playing game. There is an entire universe to explore as you try to discover both legal and illegal ways of acquiring a fortune. Combat features solid 3-D graphics and there are many extra graphic sequences as well as a whole host of problems to be solved as you encounter [illegible] fly through [illegible] worms and risk who [illegible] what when you visit [illegible] mining outposts.

Finally it is not often that [illegible] exclusively for the [illegible] a mention in this magazine but **Beyond the Black Hole** offers a definite 'first'. Its scenario is little different from most 3-D shoot-em-ups but what is different is that it offers a stereoscopic view of the proceedings. Yes, you've guessed it you have to wear a special pair of 3-D glasses while you play! All we want now is a machine that dispenses popcorn as well!

Gordon Hamlett

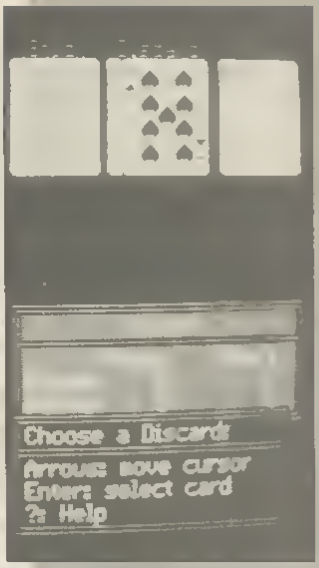


Above: Some of Mindscape's new releases

GIN KING/ CRIBBAGE KING

Software Toolworks (Mindscape) - £29.99 Disk

Gin and cribbage are two of the most popular card games. Here, at last, is a computer version that can be taken seriously.



If you want a break from the slaying of monsters and zapping of aliens then this double pack could be your answer. It contains an easy game system, tough computer opponents, even a pack of cards and a cribbage board.

Cribbage is one of the most popular card games and has often been computerised indeed several listings for cribbage games have been included in the pages of this magazine what makes this one different?

You can play two or four handed crib and you have seven different opponents each with their own style of playing. It also manages to cram the board your cards and the play on the screen so you can follow exactly what's happening.

If Cribbage King is good, Gin King is a real surprise package. Its a game that doesn't immediately spring to mind. The game mechanics are simple but the play is very tricky thus combining to make it very addictive (In just three days I played 87 games! I'd call that addictive). As with Cribbage King, the game features the same computer opponents that offer a range of different styles and strength of play clear graphics that include full card designs and a variety of options including duplicate play – so you can sent up the same hands and watch how another player would play them.

For a beginner the program offers full instructions hints and tips an easy opponent to get you going, and online help from any of the other computer players including basic strategy and specific help such as which cards to discard and why.

Without a doubt these are the definitive Crib and Gin programs and a must for all enthusiasts and addicts.

Tony Hetherington

INFO

Gameplay: 80%
Graphics: 65%
Sonics: N/A
Lastibility: 70%
Overall:
71%

WAYNE GRETZKY HOCKEY

Bethesda Softwarks

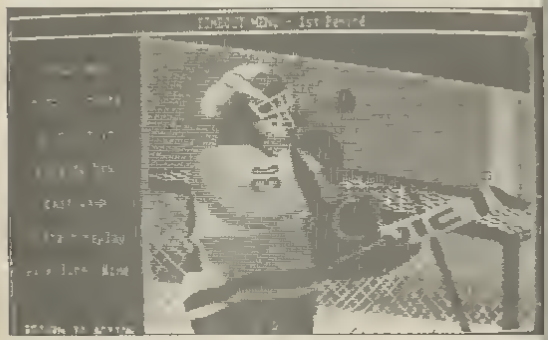
Calling all sports fans its time to strap on your skates and grab your stick for this incredible ice hockey game.

The game carries the name of the one and only Wayne Gretzky who is the big name in professional Ice Hockey He's been voted the most valuable player in the National Hockey League an amazing eight times Unfortunately, he's all but unknown on this side of the pond so the game will have to stand on its own

For one or two players the game simulates a single hockey match of between 5 and 20 minutes per period and combines both the action and strategy elements of the game On the ice its action all the way as a top down view gives you a birds eye view of the game You control just one of the players on the ice and its up to you to get into free positions so your team mates can pass the puck to your for a shot at goal In defence you can attempt to intercept a pass, hack the puck lose with your stick or grab your opponents jersey to slow him down so that your team mates have time to cover Naturally this is risky as there is a chance of a penalty for tripping or charging which may earn you two minutes in the penalty box

Above I always knew the players were on illegal substances

Above "...And the invisible striker scores a splendid goal!"



Above What a he drinking? Illegal substances no doubt!

Above " And the action is so frantic the crowd has awoken

all the above, the system is [illegible] the referees to [illegible] and for goal celebrations.

The action is only part of the game as good scoring or strategy can win a game. In that part of the game you must decide when to swap the team, or line, on ice for one of two substitute lines with different fitness levels and skills. You can also call one of five plays to send your team up the ice in a set formation or decide whether to attack or defend when you're short of a player due to a penalty.

Add to that lot, full player and team stats, sudden death overtime and slow motion action replay and you have a cracking hockey game. The only drawback that I can see is that there isn't a league to play in although I suppose, you could make up your own.

Tony Hetherington

INFO

Gameplay: 80%
Graphics: 70%
Sonics: 55%
Lastability: 50%
Overall:
64%

*This and other **Bethesda Softworks** games are imported into the UK by Active Sale and Marketing*

SCAPEGHOST

Is it a ghost story? Is it a detective story? Gordon Hamlett takes on the part of Inspectre!

Level 9 Adventures, 19.95 Amiga. 14.95 C64 cassette and disk

You cannot remember how it was that you came to be at a funeral, nor whose it is. But when you sneak a look at the name on the card on the wreath, you get the shock of your life. Although in these particular circumstances that phrase can hardly be said to be apt. The funeral is your own!

You're not rather were Alan Chance, an investigator pulled into the trail of a gang of drug smugglers. Something went wrong, though, and the gang ripped off. Only a chance encounter stopped you from being similarly dispatched but he has now been taken prisoner. What really hurts though is that you were collaborators at the funeral are blaming you for what happened. Can you clear your name in only three nights and also bring the criminals to justice? And all this when you are only a ghost!

As night falls so you start to encounter some of your kindred spirit. The local publican soon befriends you and offers to show you round. The other ghosts would help you too but they have problems of their own: the vicar is worried about the vandals in the graveyard, a happily married couple are bickering about who owns the wedding and so on.

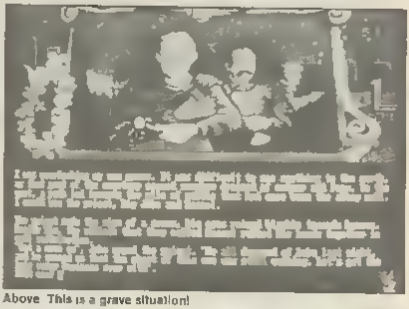
As well as helping them you have to learn about and practice your new ghostly skills — levitating objects, walking through walls etc. One of the problems is that you cannot carry very much of your chosen skill and so the manipulation of objects is not as straightforward as in other adventures. When you are struggling to hold on to a leaf, what hope is there that you can open stone coffins? Strong light causes you to weaken rapidly and as you progress in the game so you encounter other typical undead problems such as how to get past running water.

The game comes in three parts, each getting progressively harder. You only have a certain amount of time to accomplish your tasks as you have to be back in your new home before sunup. The game features *Level 9's* excellent parser and certainly, I had no difficulty with the vocabulary. The pictures are excellent and add very nicely to the atmosphere.

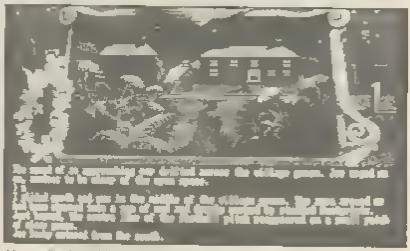
The story is wonderfully original and I think that this must be the best *Level 9* game for a long time. As it is to be their last adventure before trying their hand at something new, they have certainly managed to go out on a high note. Highly recommended.

INFO

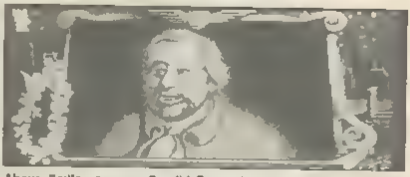
Gameplay: 88%
Graphics: 85%
Storyline: 92%
Lastability: 86%
Overall:
88%



Above This is a grave situation!



Above I'm just dying to meet you



Above Smile, you're on Candid Camera!

Above This must be Abbey Road

TREBLE *Champions*

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LIKE A VIRGIN FOR XMAS?

PREVIEW

16 BLITZ

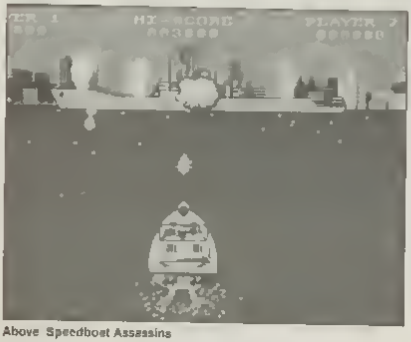
MASTERTRONIC

Mastertronic has never been a respector of apple carts and in keeping with its reputation for smashing budget prices the PC Show saw yet another pile of pippins come tumbling down At £4 99 the first of the aptly named **16 Blitz** games for the Amiga and PC look indistinguishable from some products costing four times the price The first three games on this label are **Speedboat Assassins, Roadwars** and **T-bird** with a future release schedule which includes *Activision's* **Little Computer People** and *Virgin's* **Sorcery+** on the Amiga plus *English Software's* **Knight Games** on the PC

Despite its watery setting Speedboat Assassins is a roadrace game which wets on the likes of Fire and err oh yes, Forget The roadrace element means steering a highly responsive and nippy little speedboat running the gauntlet along a narrow channel lined by some wicked-looking mines but success here leads on to pitched battles later A better name for the game would be Speedboat Saboteur as the future screens lead on to higher levels of technological carnage

How such a heavily armed speedboat can maintain its high velocity attack, or even stay afloat, remains a mystery Barring accidents it manages to defy the Laws of Physics as it blasts enemy boats into driftwood mangles telecommunications towers and even moves in to scuttle a few battleships

Sometimes its amazing how real events can mirror a battle like this When Virgin Games concluded their take over of the Mastertronic stable, shortly after the 1988 PC Show it was rather like Captain Ahab



Above Speedboat Assassins

Above The Blitz boys Ron Ron and Ron

swallowing Moby Dick whole Not that Virgin didn't have a good reputation, but their games organisation was hardly on the same scale as mastertronic's empire which ecompassed its range of budget labels **Melbourne House** a (then) new deal to market the Sega games system, and a flirtation with the video market

Today Frank Herman, the man who loomed large in the company's creation of the budget market, still champions Mastertronic's cause, assisted by his old mate Alan Sharam Now with their abilities combined with Virgin Games' boss, Nick Alexander Virgin Mastertronic has a new vitality

Virgin Games hadn't really done very much since **Dan Dare** but it blossomed earlier this year with the brilliant **Silkworm** and the highly successful **Double Dragon** More fruits are now starting to appear in time for the Christmas consumers and **Double Dragon II** is spearheading the attack

At the end of Double Dragon, Billy and Jimmy Lee made Marion a free woman again, but her captors the Black Warriors were not totally eliminated One member escaped and she, with her new Tong have dispatched Marion to that great pagoda in the sky Billy and Jimmy are a bit peeved off and have sworn revenge and will be out for vengeance in November Eight bit or 16 bit, the choice is yours

Taito's **Ninja Warriors** is another Ninja binger currently in the Virgin Mastertronic pipeline and due for release in December Rebel leader, Marc, has built two Ninja robots to defeat the world's latest dictator Bangler These Ninja Warriors are under your control as they make bangler's criminal army see stars (little, pointed metal ones) Can I save the world sure I can

Continental Circus has nothing to do with jugglers but from what I saw at the Show, you do need a lot of balls to get through this roadrace As race games go it has little to lead me to recommend it over the hordes of games of this genre As good as some better than many, it will have a hard time battling against Domark's excellent **Hard Driving**' or the reputation preceding the launch of US Gold's **Outrun II**

By far the biggest news from the Virgin Mastertronic stand at the Show was their Christmas Coin-op Collection Competition With prizes totalling £30,000, it's the biggest gamble that the company has ever taken – either before or after the take over

The competition is based around Virgin Games Silkworm, Gemini Wing, Shinobi, Continental Circus, Double Dragon II and Ninja Warriors To qualify, tokens must be collected from any three of these games before January 1990 Submitting the game and answering a 'simple' question puts an entry in the grand draw and the five winners will each receive £1 000 worth of their chosen software (not necessarily Virgin Mastertronic stock), or £500 worth of software plus an Amiga for the intelligent or an Atari ST for those who don't recognise a bargain when they see one – by the way I noticed one friendly loon at the show scrawled HI' between the S and T of the Atari logo Although we don't condone such disgraceful behaviour good on yer, sport And to show no ill intent against Atari what do you call Silkworm on the ST? Virgin on the ridiculous

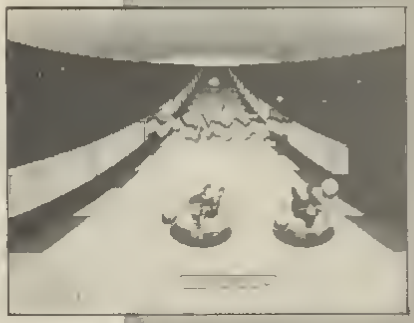
The rest of the prize money for the competition comprises 10 second prizes of £500 of software and £250 worth for each of the 20 third prize winners

Elsewhere in Virgin's Vernon Yard HQ, Melbourne House and Leisure Genius are still chugging away Looking like Double Dragon on dope Cyst

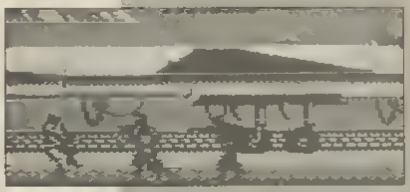
sorry, Fist II [illegible] to appear on Mastertronic at a realistic price of £2,99, while Melbourne House pursues its current trend for fantasy role playing and graphic adventures with **Demon's Tomb** and **Grimblood** plus the conclusion to the bloody grim **Lord of the Rings** trilogy as Frodo and Sam plod on towards the War in Middle Earth

Leisure Genius sounds much more hopeful with their trilogy **Monopoly, Scrabble** and **Cluedo** for a combined price of £19 95 (64 only) There is also the promise that my favourite board game **Risk!** will soon be appearing Ah! World domination isn't that what life's about?

Incidentally you may have heard that 1990 is the latest nominee for the Year of the Games Machine whatever happened to then in 1989? Consequently the Virgin Mastertronic stockrooms are frantically being loaded with Sega games which sounds like the storm before the calm [illegible]



Above Roadwars



Above Ninja Warriors

Above Kelly X

OPERATION THUNDERBOLT

Ocean – £9.99

The sequel to last year's Christmas number one leads Ocean's challenge for the top.

Operation Thunderbolt is the sequel to the chart topping Operation Wolf It is already a big hit in the arcades and aims to repeat the success of its predecessor thus claiming the lucrative Christmas number one spot for Ocean for the second time in a row

When the reports first started coming in it was clear that flight number 102 from Paris to Boston had been hijacked It had changed course for somewhere in Africa and information received reveals that the plane has landed in hostile territory and the terrorists have issued their demands

Weary from your last Operation Wolf mission you are persuaded to launch a rescue mission only this time you don t have to go alone as you can take one of your buddies with you Which is just as well as this is going to be a tough mission behind enemy lines So the game actually consists of a series of small missions or stages that lead to the final battle onboard flight 102

Your first task is to find out where the plane had landed and you need some information To get this you must battle your way through an array of enemy troops (that fire guns and hurl grenades and knives at you) until you can meet up with your contact who will direct you to mission two which is an attempt to attack and seize the enemy's supply and arms dump

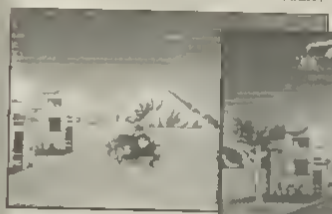
Eventually you will board the plane and engage in a pitch battle with the terrorists who use the seats as cover Your only hope is to fight your way to the flight deck and hope the pilot survives the battle, so he can fly you and the hostages to safety

Operation Thunderbolt has many things in common with its prequel but also boasts a whole new range of action features Scenes and missions alternate between Op Wolf style sideways scrolling screens and the new 3D views where you fight as you move into the screen The troops tanks, paratroopers and helicopters of Op Wolf are back in action, but they are also joined by jet fighters and new weapons (including rocket launchers and knives) to dodge and destroy The players still have a limited number of machine gun cartridges and grenades that can be topped up by collecting supplies and you can also collect new equipment such as a laser sight for increased accuracy and a bullet proof vest to save your dwindling force

The biggest single difference to the game is the addition of a second player that not only doubles your firepower against the enemy but also produces incredible rivalry as shot to hit percentages are compared and supplies and equipment are vied for

Look out for this one as Operation Thunderbolt is going to be a monster hit

Tony Hetherington



Above and right: Nuke 'em, nuke em, nuke em, nuke em nuke em, nuke em!

INFO

Gameplay: 85%
Graphics: 88%
Sonics: 65%
Lastibility: 85%
Overall:

81%

Ocean boasts an impressive line up for this Christmas including Batman Cabal and the remarkable Untouchables

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Britain's First Music Magazine for the Computer User

ZX SPECTRUM

OCEAN - £9.99 / £12.99 disk

The smash hit film of the Summer has exploded onto the computer screen. This time you star in Batman - The Movie.

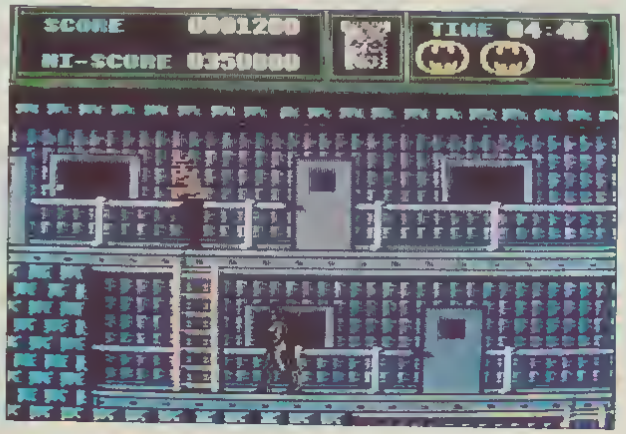
BATMAN THE MOVIE

By day multi-millionaire Bruce Wayne is the mild mannered head of the Wayne Foundation but at night, when evil stalks the streets of Gotham City he becomes the sinister masked vigilante known only as Batman

Crusading against crime from the rooftops of the sickened city, Batman's main aim is to eliminate Gus Grissom's criminal empire and in particular Jack Napier, his psychotic second in command who following an accident in his own chemical factory becomes twisted both mentally and physically, and transfroms into the Joker Your battle with the Joker takes you through five stages of the game that follow scenes from the hit movie

The Axis chemical plant is the setting for the first stage, in which you must negotiate the network of ladders and ramps with help from your Batrope, and fight the Joker's henchmen with your Batarang It is on the final scene of this level where Jack Napier falls into a vat of chemicals and becomes the Joker

In scene two you have just rescued Vicky Vale from the clutches of the Joker and are making good your escape However this isn't going to be easy as you not only have to avoid the Joker's men but also the police cars and road blocks Drive fast and follow the directions highlighted by the Batdirectional computer



Left You too can dress as Bernard Manning and fight crime as Fatman

Above I wonder if the Batmobile has a sticker in the rear window that says "my other car's a Skoda! ?

Meanwhile, back at the Batcave The caped crusader has just 60 seconds to dis cover which three household items contain the compounds that combine to form the Joker's deadly Smilex which kills on contact Level four takes you back onto the streets of Gotham City only this time in the Batwing The Joker has massive balloons full of Smilex gas that he is about to release on unsuspecting crowds Your task is to use the Batwing to cut the ropes that secure these balloons so they float off harmlessly However one wrong move and the balloons could burst and hundreds could die

Above Stop the Press!

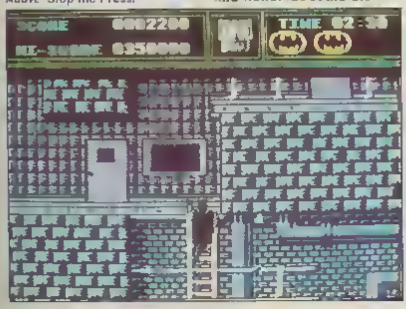
The final duel between Batman and the Joker comes at the top of Gotham City cathedral This is similar to the first encounter in level one except our hero must also watch out for crumbling floors and rapid rats

With the film's success behind it the game cannot fail However, under the hype costume and drama it is simply a shoot-em-up with two platform game elements and, in level 3 a Master mind

Tony Hetherington

INFO

Gameplay: 55%
Graphics: 65%
Sonics: 50%
Lastability: 55%
Overall:
56%



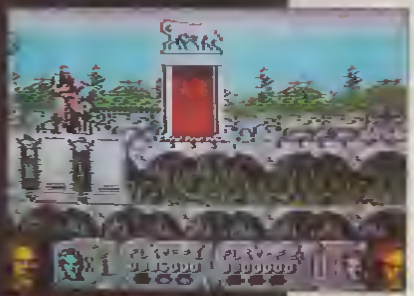
Above Batman e got e ladder in his tights.

Above If a cow pooped on his head he d be Petman!

ALTERED BEAST

Activision - C64 - £14.99 £9.99 disk/ cassette

Gordon Hamlett waits for a full moon before taking a look at Activision's lates release.



...ng and maiming! ... beating!

INFO

Gameplay: 40%
Graphics: 35%
Sonics: 40%
Lastability: 30%
Overall:
36%

a large throne ... urinal is as big

Mummy! Mummy! What's a were-wolf? Shut up and comb your face! It is a well known fact that the Gods on Mount Olympus did not always live a life of perfect harmony Indeed, they seemed to be constantly at loggerheads with one another The only advantage was that being gods, they didn't actually have to get their own hands dirty Instead, they would just toss a few thunderbolts around and influence the lives of a couple of mortals to go and do their dirty work for them

Anyway, it appears that the goddess Athena (should be Athene) has got herself captured by Neff the Evil Lord of the Underworld (why invent a name? What's wrong with calling him Dis or Pluto?) Zeus decides to rescue her but instead of doing it himself, empowers you, a dead centurion, (note the subtle switch from Greek to Roman mythology methings that whoever wrote this was not a classicist) with the strength of some of the most fearsome beasts in the kingdom

So it is that you embark on this adventure shape shifting as you become more and more powerful Your various guises include that of a strongman, were-wolf, bear, were-dragon were-tiger and golden wolfman

Despite my mocking it, the storyline sounds reasonably inventive It is only when you actually start to play the game, that you realise that you've been here before Yes, the game is yet another beat-em-up, and not a very good one at that.

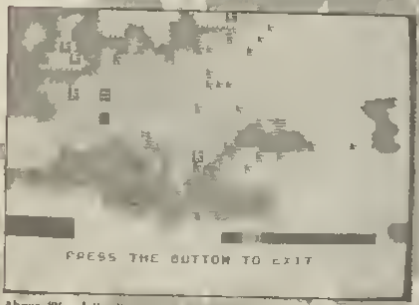
As you wander along each section, so there are hordes of zombies and the like for you to kill The problem is that this is all too easy Each of your incarnations has a special weapon-super strong punch, fire breathing and so on All you have to do is to find out how best to use that weapon For example on the first level crouching down and punching will see off all your opponents The only exception are the creatures that spring at you These are the important ones, since when you destroy one of these, they release a 'spirit ball' which bounces round the screen Catching this effects your metamorphosis

The rest of the game is pretty dire too The graphics are dreadful very fuzzy and unclear Scrolling too leaves a lot to be desired You spend most of the game on the right hand edge of the screen waiting for the background to catch up All in all this game's a very poor effort and should be left well alone

STORM ACROSS EUROPE

SSI – £24.99 Disk

50 years ago Hitler unleashed a storm of destruction across Europe. Now you can simulate the entire war in a few hours.



Above "Yes, let's all press the button..." – Ronald Reagan, 1987

September 1939 Hitler launched his blitzkrieg invasion of Poland that triggered the Second World War Now up to three players can recreate the battles and problems of that era in one of the most playable SSI wargames In a solo game you control the forces of the Reich against Allied and Russian forces controlled by computer, which can be replaced by humans if they are available

As commander in chief you must not only organise your troops in battle, but also manage your limited resources of population, raw materials and industry to both research new weapons and produce the land sea and air forces that will be required to win the war These resources are gained by conquering territories during the four three-month turns in a year and assigned in Spring to research projects and production

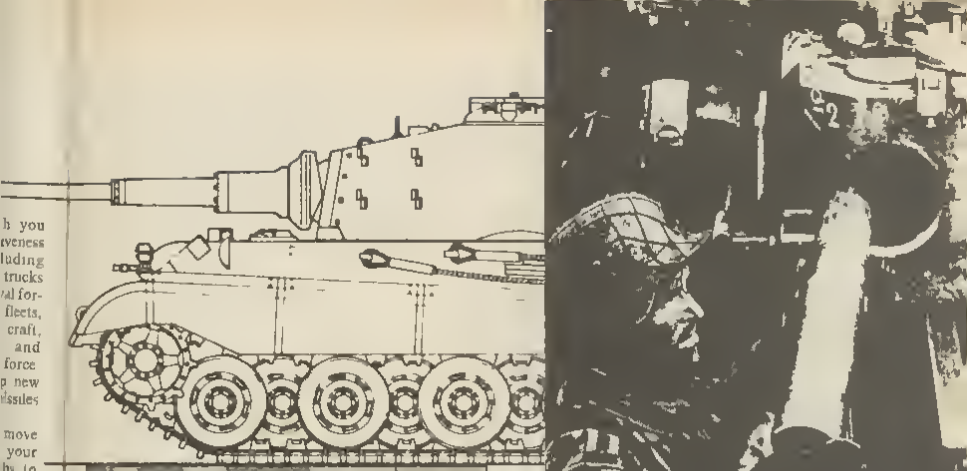
Through research you can increase the effectiveness of land units, including tanks, troops supply trucks and paratroopers, naval forces (ie submarines), fleets escorts and landing craft, and the fighters and bombers of the air force You can also develop new weapons, such as missiles and nuclear weapons

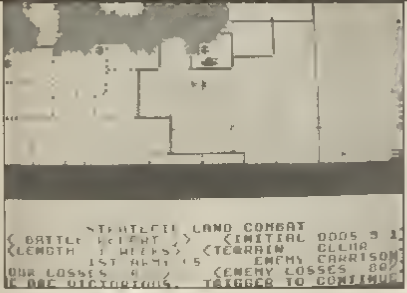
In a turn you can move your troops around your empire, send your subs to raid enemy shipping, launch an amphibious invasion try and break through an enemy position, and send your bombers (complete with fighter escort) to bomb either enemy aircraft or production

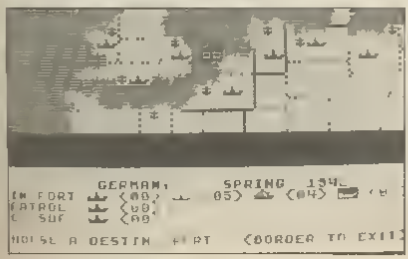
The program contains several scenarios and variables that can be set to create a variety of challenges not only providing a strategic challenge but also an insight into the war such as how vulnerable Britain was to invasion in 1942 and the horrendous losses inflicted on both sides when Germany attacked Russia.

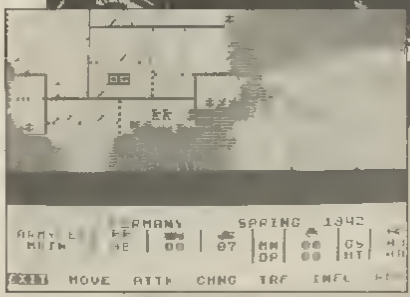
The game manages to provide historical accuracy in a playable form which should appeal to more than the hardened band of hex wargamers For example, instead of having to occupy every province of a country to conquer it you only need to occupy key areas such as Paris and Marseilles for France and only Warsaw to defeat Poland

Tony Hetherington









Above left: And so they came across the hills, bearing banners, slogans, and crude weapons. Their breath stank and their foul language resounded through the valleys. It was the coming of the England supporters. It was War

Left: Let's take that small island over there "England" you say

Left: The troops are under fire which is better than being on fire!

INFO

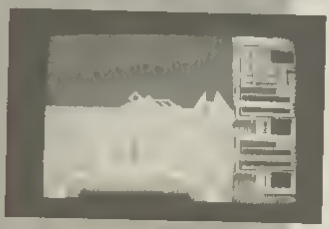
Gameplay: 95%
Graphics: 65%
Sonics: N/A
Lastibility: 95%
Overall:
85%

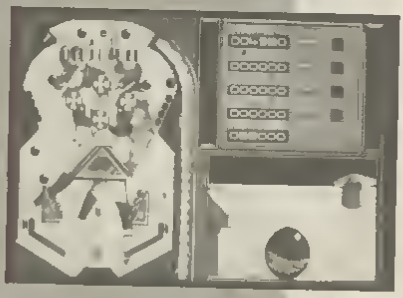
SSI specialises in computer wargames and roleplaying games including the AD&D range

TRIP ALONG THE TYNE

It is not often that a company can claim to offer something for everybody with just four titles, but that is just what Tynesoft are attempting to do with their forthcoming releases.

Left. Beverly Hills Cop Considerably less messy than Beverly Hills Plop





Left 1st Person Pinball. A game with more balls than the Amsterdam Museum of Sex.

Their biggest title and one which is hopefully going to be out in time for Christmas is **Beverly Hills Cop** based on the Eddie Murphy film

The game is split into five different sections. Before Axel can start to solve the crime he must first follow his colleague to the arms factory where the robbery is taking place. If he gets through the early morning traffic in one piece he then has to chase one of the gang members as best he can. Naturally he can't use his gun with so much explosives lying around

A high speed car chase issues as you try to find the mansion where the trucks are heading This is the headquarters of Mr Big and you have to find a route through the maze of hedges in his garden before forcing your way into the house and the final encounter All you have to do then is get out

Roller Coaster Rumbler is a shoot em-up with a difference. Not only do you get a high speed trip round one of the meanest big dippers around but you must also blast away the moving targets before you are forcibly ejected from your seat

Role playing fans can look forard to **Elvira – Mistress of the Dark** on the *Horrorsoft* label This is a totally icon and menu driven game featuring some superb 3-D graphics

As your character progresses, so you must develop your various skills strength, dexterity and so on Combat is fully animated and you are given various options depending on whether you are on the offensive or defensive It is also quite important to use the right weapon at the right time You might be able to get past the screaming falcon if you have the bow and arrow and if you have enough skill to be able to use it properly

There are plenty of puzzles to be solved and the promise is that they are going to be tough It will not be simply a case of using the right object in the right place Even knowing exactly what he is doing the author reckons that it will take him about seven hours to complete the game so what hope is there for us lesser mortals

Finally, a game scheduled for release early next year is **1st Person Pinball**, a version of the arcade game This game is unusual in so much as you can switch from the usual top down 2-D view of the table to a 3-D perspective of the game as seen from the ball's point of view As a dedicated pinball freak there is a serious lack of decent games on the Amiga Hopefully, **1st Person Pinball** should be just what the doctor ordered

Gordon Hamlett

XENOMORPH

Pandora – £24.99

Dungeon Master style 3D adventuring takes off into space with *Interceptor's* Xenomorph.

It was supposed to be a routine supply mission to Cygnus 61 when suddenly, everything went very wrong. Firstly, you managed to crash your ship on landing and now have to find materials to get it fixed and secondly, the colonists seem to have disappeared which isn't all that surprising as the base is now overrun by mutating aliens.

The base in question is represented on screen as a series of scrolling 3D rooms and corridors which forms the main part of the screen display. Around this are five smaller displays that include movement icons, what you are holding in each hand, your backpack and a personal display showing your current state of health and a picture of you that you can customise using the programs DNA machine so that your on screen persona can match yourself a hero or favourite *Your Commodore* reviewer. One particularly impressive feature of the game is that when you are getting something out of your backpack that screen fills the main screen area and the player status screen becomes a mini version of the 3D view that still scrolls and displays all monsters and objects so you can carry on with the action.

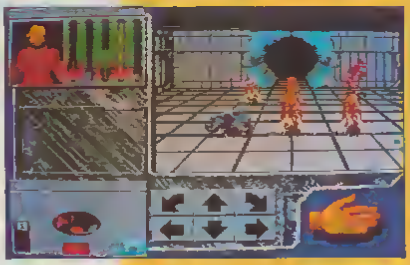
Apart from the variety of background displays of which the enclosed air ducts are my favourite, the range of weapons featuring laser rifles, stun pistols, grenades and alien seeking robomines and the objects such as a proximity detector that you can find, the main appeal of the game is its range of aliens and the way they change and mutate. One example is best described in its adult form as an insectoid lobster but begins as a harmless egg which can be easily fried with a single blast of a laser gun. Once it hatches it turns into a worm like larvae that scurries away to hide from you, where it wraps itself into a cocoon and metamorphosises into the insectoid lobster that comes looking for you.

Not all creatures are that complex as the game also features a rather unpleasant green blob that when blasted turns into two green blobs! In this game you have to learn which weapons to use against which creature and it isn't always easy to do this when you're fleeing from a horde of monsters.

Tony Hetherington

Pandora is part of the Interceptor *group of companies that also includes the* Players *budget range*

Right: "Okay, who's sneezed on the ceiling?"



Above: Give the guy a hand

Above: He must've gone to a second hand shop!


YOUR
COMMODORE

YOUR PROGRAMMER

CONTENTS

How to use the pull-out...

Remove from magazine and cut spine. Punch holes on edge and insert in a ring binder for easy storage and long-term protection. Alternatively you could feed them to the dog, but I favour the former.

MACRO ASSEMBLER

Be the master of your machine code program with this extensive 3 pass macro assembler

By I. Goffe

Many assembler packages have been available for the Commodore 64 since the arrival of the machine, but sadly many such pieces of software are scarce in the shop today. I have noticed a steady revival of assemblers, thanks largely to magazine such as this, it is especially true of the 6510+ assembler in the May/June issue of its sister magazine *Commodore Disk User*, which offers many more facilities than its commercial counterparts. My Macro assembler is intended to be yet another valuable tool to the machine code programmer with the added bonus of macro and conditional assembly, this allows much more structure to be implemented into your own machine code programs.

Presented here is a sophisticated 3 pass 6502/6510 Macro Assembler that supports many advanced features including:

Full macro assembly with parameter passing,
Linkable source files,
Including directly from disk,
Symbol table buffer space memory configure,
Conditional assembly (IF, THEN, ELSE),
Symbol table cross-referencing;
Selective assembly output,
Full DOS support,
Extendable capabilities.

The assembler can be configured to work with either disk or cassette filing.

The Assembler – Getting Started

The assembler code runs from $6E00-$A000. To initialise the assembler from a cold start type SYS 28160 this redirects the RESTORE key to allow you to enter the assembler command mode with a single stroke key press. If you should change the RESTORE key vector use SYS 28160, which will re initialise once more. The use of a cold start also clears the current symbol, macro directory, and macro library areas.

Once a cold start has been issued as above, the program title will be displayed, at this point as Basic wedge was to be used to enter the assembler command mode, but I wanted the system to be able to run alongside an extended Basic if there are no memory conflicts. I opted for the idea of being able to call up the main assembler command mode by pressing a single key which emulate the Basic command 'SYS 28215' which calls up the assembler command mode via a warm start.

To summarise, pressing RESTORE whilst in the basic editor will automatically do the Basic command 'SYS 28215' to jump into the assembler via a warm start.

Extra Note on Compatability with Action Replay

Some ROM routines which are called inside the assembler seem to corrupt when the assembler is first run, to get around this problem follows these steps:

1. Type SYS 64738 to jump into a normal reset.
2. Press the reset button on the back of the cartridge to exit back to the 'FASTLOAD' interpreter which will allow the assembler to operate. In this case all FASTLOAD/Warp loading can be used in conjunction with the assembler, making source file I/O extremely fast and effective.

The RESTORE key does not work correctly with 'FASTLOAD' installed, so a manual 'SYS 28125' needed to be typed to jump into the assembler command mode.

Entering Source Files

The source files are maintained in the standard Basic editor, so you will not need the assembler present for actually entering the source. As in Basic only lines 0-63999 are valid.

The source must follow a set format, however, true field-tabulation is not required for LABEL, OPCODE, OPERAND but some form of correct syntax needs to be followed. In general the syntax would be one of:

LABEL OPCODE OPERAND,
LABEL !
OPCODE,
OPCODE OPERAND

Note that if a label is not followed by an opcode then a comment (!) is expected. A comment can be used in any available field. A space is needed in between the 'fields' and where applicable quotes must be set out in the text correctly.

eg)
10 LDA 10 ! space between LDA and 10
20 LABEL ! a comment is needed if no following opcode
30 DINCLUDE "name" ! opening and closing quotes needed

When an opcode of the form ROL A ASL A is encountered it should be entered with no space as ROLA to avoid the confusion between

ROLA (Rotate left accumulator)
and
ROL ALABEL (Label beginning with 'A')

Pseudo-Opcodes (Assembler Directives)

Pseudo-opcodes can be used in the assembler to enable you to direct or command the assembler to carry out various functions at assembly time only

A complete summary of pseudo-codes follows with their syntax, and use

PSEUDO-CODE summary

(Take x = valid expression)

DIRECTIVE	USE
BYT x, x1, x2	Stores x and the following 8-bit numbers in memory, any valid expression is allowed along with a string of characters if they are given in quotes eg) BYT $C0, $FE04 "text", %00001001
DINCLUDE "filename"	Includes a source file directly from disk, using up no available memory
ELSE	Toggles the conditional flag, on a new assembly the condition is set to true – assembly turned on
ENDIF	Turns off any condition to continue assembly as normal
IF x	Sets condition true if x is non-zero, if x is zero then subsequent assembly will be turned off until another conditional statement proves otherwise
LOAD x	Stores object code at address x but takes references for absolute values from the origin (*)
LINK "filename"	Links next source file to continue assembly see the section on this function
OUT x	Sends assembly text output to device x, default is 0 (no output) 3 = screen, 4 = serial printer
RELINK "filename"	Used to cycle to the first file in linked assembly for the next pass ie) the last file in linked assembly should end with RELINK "name", where name is the first file in the linking
RUN x	Sets the execution address to x the address that the editors 'G' command will jump to
RES x	Reserves x bytes of memory, in essence it adds x bytes to the program counter, and is used to define storage space
SYM "filename"	Appends a previously saved symbol table into the current symbol table being produced by the source file This allows symbol cross-referencing between files Note that the symbol table limit is not checked for as a complete-block-load is used for speed so be careful when using this option Any labels previously defined before a symbol table is loaded are not checked for re-defined errors, in this case the first reference in the table is used Any subsequent re-defined errors are issued when defining labels outside of this directive
TXT "string of text"	Stores a single string of ASCII characters in memory
WOR x1, x2, x3	Stores x in memory as a 16 bit number in lo hi byte form

Note that the origin of the object code is defined by the * symbol, eg) 10 * $C000 will define the origin as 49152 decimal More than one origin can be stated in the source but only the last one can be used in the direct object save command in the editor

The 3 Passes

A three pass assembler has been incorporated in order for the assembler to be more versatile, this is especially true in the case of forward referencing eg) in equate lines To show this a small source file to pass values from label to label is shown *Supersoft's* MIKRO ASSEMBLER, and the 6510+ assembler cannot handle the following example totally correct, but this macro assembler can try it for yourself!

```
                OUT 3 ! no operand in the
                      6510+ assembler * $C000
C000 A50C              LDA LABEL1
C002 EA        LABEL 3 NOP
C003 EA                NOP
C004 A50C              LDA LABEL 1
            LABEL2=10+LABEL3
            LABEL1 LABEL2-49152
```

As it can be seen LABEL1 is $0C and the object code created gives this result, but try it on the other 3 pass assemblers mentioned above!

The Editor command Mode and Set

When the assembler is entered via warm start by either pressing RESTORE after a cold start, or a direct command of SYS 28215, you will be presented with a prompt (>) this is the editor command mode, and is where you type in the editor commands listed in the table below These allow you to operate various features of the assembler eg) assembling and maintaining source files A complete summary of the editor commands available, and general syntax follows Each command is called up by entering a single stroke command letter Any arguments used in the commands are separated from the command letter by a single space Each argument thereafter is separated by a comma

Editor Commands Summary

A
SYNTAX ARGUMENTS n/a

Will assemble the source file in memory During assembly pressing RUN/STOP will abort to the com mand level Upon aborting the line at which assembly was aborted will be displayed and if applicable the file which it was reading at the time this is also true for any error reports during assembly time

If any files are read into the assembler during assembly including, and reading macro definitions then the disk status will be displayed to signify that data is being read in from disk instead of memory

This is shown on screen by two sprites in the shape of disks, the left-most one will change colour only on the reading of a new file so if more than one file is to be included in the source for example, then the first file

"filename"

will show as a white sprite (colour 1), the second file when being read will show as a red sprite, etc this is the same on all passes as the colours are automatically reset

The right-most disk-sprite will flash to show that data is being read in externally

B
SYNTAX/ARGUMENTS n a

This command exits back to Basic, or from the return destination if another program calls the assembler

D
SYNTAX, ARGUMENTS n/a

Causes a listing to screen of the disk directory, without corrupting the basic program, as is the case of the LOAD "$",8 command from Basic

E
SYNTAX/ARGUMENTS Any valid expression

Following this command you can evaluate any expression that can be used inside the assembler this includes all the valid operators and pre-defined symbols from the current symbol table

F
SYNTAX/ARGUMENTS string to find (no quotes needed)

Finds any occurence of the given string in the current edited source file The strings that are found will be shown by their relevant line numbers Pressing RUN/STOP at any time aborts from this mode

G
SYNTAX/ARGUMENTS Pre-defined RUN value from source

Goes to the address specified by the RUN directive A new assembly resets to a no-run mode only a new RUN value which is given whilst assembly takes place will allow this command to operate

H
SYNTAX/ARGUMENTS n a

This command displays a summary of this set of command-letters

I
SYNTAX,ARGUMENTS "filename"

Saves the last object code with start, and end addresses taken from the origin (*) – this only applies to the last origin used, if there has been more than one value given as *=value

J
SYNTAX/ARGUMENTS "filename"

As the I command, but saves from the addresses taken from the LOAD directive

L
SYNTAX ARGUMENTS line number (no value = start of file)

Lists to screen the current source file from the line specified

M
SYNTAX/ARGUMENTS n/a

Lists the present macro library Once this command is issued a directory of the macro-definitions currently in the macro library is given one filename at a time

After each name is displayed the keyboard is polled for a key press pressing 'L' at this point lists out the macro in its expanded form, whilst any other key brings up the next file in the macro directory When all of the macro directory has been displayed the number of spare bytes in the macro library is given, note that such space wasters as comment lines are deleted in order to compact the data given to the macro library as much as possible

N
SYNTAX/ARGUMENTS

Appends a source file, once loaded the file is automatically renumbered

O
SYNTAX/ARGUMENTS n/a

OLD – brings back a previously NEW'd program, or one erased after a reset

Q
SYNTAX ARGUMENTS "filename"

Saves out a copy of the current symbol table for use with the SYM directive to cross-reference between files It is also useful if a debugger was to be written for the system to take advantage of symbolic output

R
SYNTAX/ARGUMENTS start line, step

Renumbers a file with the given start, and line step values

S
SYNTAX/ARGUMENTS "filename"

Lists a source file directly from disk to the screen, no memory is used, and therefore the current source file is not over-written

U
SYNTAX ARGUMENTS start line step

Jumps into Basic, with an auto-line numbering entry enabled The start line and step are given, and after each press of RETURN the next line for editing is displayed entering a null-line exits from the AUTO mode Jumping back via a warm start will bring you back to the command mode

X
SYNTAX ARGUMENTS n/a

Saves a block of memory enter with no parameters as you will be prompted for the address range and filename Note this routine ignores any checks on undefined labels if used

Y
SYNTAX ARGUMENTS n a

This command lists the current symbol table, with values given as hexadecimal values Pressing RUN STOP will abort

to send this output to a different device other than the screen use the added configure program

Z
SYNTAX/ARGUMENTS n a

All the features of the 1541 DOS have been incorporated into the assembler Once in this mode you will see the prompt 'DOS' to let you know that you are in DOS support mode Following this is the usual prompt, typing any normal DOS command in at this sgage eg NEW0 ANYDISK 64 to format a disk would be accepted, the error channel is automatically displayed after any command If RETURN is pressed the error channel will be displayed and updated, pressing 'X' will exit back to the main editor

Labels

A label or symbol in the macro assembler can be of 2 forms firstly it can be defined as a constant by using the =' symbol

10 RESET = 6473\$ ' 16 bit constant
20 ZEROPAGE = 10 ' 8 bit constant

It can also refer to a location in the source file to be jumped to or operated upon in some way

10 LABEL ' location within the source file
20 BEQ PANEL ' branch to it
30 COUNT BYT 0 ' holds an 8 bit number
40 COUNTHI WOR 0 ' define as word (16 bit)
50 LDA COUNTHI ' lo byte of COUNTHI

Labels which have not correctly been given a value will be suffixed with an "*" in the symbol table

Storing Object Code

The directive LOAD is extremely useful when the address that you want to store your code at is inaccessible with the assembler present For example if you wish to run a routine from the default screen address (1024) any data that is POKEd to it would of course be over-written by on-screen messages before you have time to save it You would therefore store it at a suitable area of RAM eg) LOAD $C000, but give the origin address as * 1024, you could then signify a relocatable load address of 1024

Note that the LOAD directive is needed AFTER the * is set, if the * is given after a LOAD then the origin will over-ride the LOAD, and store data from the base of the origin

eg) * = $2000 ' Labels and jumps will take values from here
LOAD $C000 ' but code will be stored from $C000 onwards
(Note the above order)

When assembly has been successfuly completed the object code start and end addresses will be displayed and if a LOAD directive has been used then the storage address will also be shown The execution address will also be displayed if RUN command has been used

In the following text the 'TOP LEVEL SOURCE' file relates to the file actually in the Basic editors memory

Using DINCLUDE and DEFINE

If including (DINCLUDE) or reading in a macro definition (£) you must use the command within the TOP LEVEL SOURCE file therefore all included files must not try to include a file from inside itself Similarly, they should not try to define a macro definition (£), ie DINCLUDE and £MACRO-NAME directives cannot be used in a file that already been included with the DINCLUDE directive itself

If an attempt is made to do the above then a 'NESTED' error will be issued The errors are 'NESTED INCLUDE' when an include uses a 'DINCLUDE' directive, and NESTED INCLUDE MACRO' when a macro definition is used within an included file

Extending/Larger Source Files

At sometime during writing source files you will appear to have used up all available source file memory To get around this, two pseudo-opcodes have been used to chain or link more than one file together for continuous asembly

LINK "filename' is used to chain the next file for assembly while symbols are still retained from the previous file
RELINK 'filename ' is used to restart from the first file in the link for the next pass there is no limit on the number of files linked only on the symbol table space that is used up, and the 'physical' address being poked to

LINKing reads the whole file into the editor workspace completely overwriting the previously edited file The only advantage over including directly from disk is that files can be read into the workspace much faster

It also allows some form of compatability with the LNK command found on Supersoft's MIKRO assembler

A more powerful command is the DINCLUDE directive which allows direct including from disk It is another way of assembling an expanded source file by allowing more than one file to be assembled as in the LINK command. But it has the added advantage of not overwriting the source file currently in memory this allows you to store you object code in more available memory which the included source file would have been occupying if it were read into the editors workspace as a complete edited file

Using Macros

MACRO DEFINITIONS
A MACRO DEFINITION is stored as a single source file on disk, and each is loaded in separately to make up the MACRO LIBRARY A MACRO LIBRARY is used to give details of what the current macro library holds

Macro definitions consists of any portion of a source file that you only have to write once as a macro definition and a call' to that macro will expand it to a totally relocatable part of the main source file

Therefore if you need to keep using the instructions CLC LDX #$10, LDY#$10 JSR $FFF0 to set the cursor coordinates to (10,10) it is

rather time consuming, and a waste of source file space to keep keying in the same code. Instead you could define it as a macro definition called CENTRE. To achieve this type the commands as you would a normal source file, and save the file with SAVE 'CENTRE',8

Each time you wish to use the given instructions instead of typing out the same code you can 'call up' or 'invoke' the macro 'CENTRE' and the instructions LDX #$10, LDY #$10, JSR $FFF0 will be generated into your source file. See the section on how to invoke the macro files, and add them to the macro library.

Added Macro Features

A couple of features are included to make the macro definitions more meaningful. The first feature is to allow true parameter passing upon invoking a macro.

parameter Passing in a Macro Definition

The macro definitions can accept parameters by using the '/' character to preceed a parameter number between 0 and 9.

```
eg) LDA #/0
    STA /1
```

in the macro definition would change /0 into the text passed by parameter 0, and /1 with parameter 1.

See the section on macro invokation for more details of how to pass parameters within macros.

Localised Symbols

All labels within a macro definition will be read in as a local symbol, this is achieved by adding a unique 2-digit code to the symbol within the definition. e.g. the symbol LABEL1 within a marro definition will be given as ABLABEL1 on the first 'call' to the macro, ACLABEL1 the next time, etc, this is so that the symbol LABEL1 is not redefined everytime a macro is invoked, and also direct references can be given to labels within individual macros.

Every reference within the macro definition to a label automatically refers to one within a particular macro (a local reference). If you wish to refer to a label outside of the current macro definition you must signify that it is a global reference. this is achieved by prefixing the label with a full stop.

The following is the source inside a macro definition

```
BEQ LOOP ' refers to the label
'LOOP' inside the current macro
definition
JMP MAIN ' refers to the label
'MAIN' outside of the current macro
definition
```

Adding a Macro Definition to the Macro Library

In order to invoke any macro it must first be stored within the macro library. A previously saved macro definition can be added to the library by prefixing the macro name with a £ symbol.

```
10 £MACRONAME
```

Note that there is no space between £ and the filename. The macro definition must be given to the macro library BEFORE it is invoked.

Listing the Files in the Macro Library

To summarise what macro definitions are present in the macro library you can view the macro directory with the use of the library you can view the macro directory with the use of the editors 'M' command.

Invoking Macros

This is the term used to expand the macro definitions into the source file. Once a macro definition has been stored in the macro library it can be invoked in the source file by using the @ symbol to preceed the macro filename to be invoked.

```
10 £machroname ' adds the macro to
the macro library
20 macroname ' invokes (expands) the
macro
```

Parameter Passing During Macro Invocation

The macros to be expanded can be called up with parameters as discussed in the section on macro definitions.

To invoke the following macro definition

```
10 LDA#/10
20 STA/1
```

Save it to disk with SAVE "POKE MAC",8

The above example is to define a rather simple POKE x,y type of macro definition but serves its purpose. Once it is saved type NEW to clear the current source file and type in the following

```
10 *$C000 ' sets origin
20 £POKE MAC ' gives definition to
macro library
30  POKE MAC 5,53280 ' pass the
poke value, address
40 RTS
```

It can be seen that parameter 0 is 5 (the source will now contain LDA 5), and parameter 1 is 53280 (source contains STA 53280)

A parameter can take any form whatsoever, opcodes, varius operands or any valid expression. Each parameter is separated by a comma. wso if you are passing text, as in "HELLO, MY NAME IS ' the comma would tell the assembler that it is the end of that parameter so be careful!

The number of parameters allocated to a particular macro is 10 (0-9), however more than this is allowed if ASCII codes which follow "0-"9" are given, but 0-9 should be used as standard. Because all labels within a macro definition are operated on as localised, any parameter passed to it will need to prefixed with a full stop if they refer to a global label outside of the definition.

Example of a Top Level Source File

```
10 RED = 2 ' global label outside of
a macro definition
20    COLOUR  RED ' prefix with
a '.' as we are using the global label
RED within the macro definition
```

You will be told if you try to invoke a macro that is not present in the macro library. If a parameter is required by a macro definition and one isn't given on invoking it, a 'PARAMETER MISSING' error will be issued. This is because no comma will be looked for (as it is param.0) and data that was expected to be in the buffer will be used. The above is of course a rarity but worthwhile to mention. Any parameter given to a particular macro definition will only be verified once it has been expanded into the source file.

Where to Invoke Macros

You cannot 'nest' a macro, ie call a macro from within a macro definition - if you do a 'NESTED MACRO CALL' error will be given It is possible to invoke a macro definition from within an included file If an error occurs when invoking a macro, the line of the invocation will be shown But the text given will be from the offending syntax from within the macro file At this point a comment symbol will appear preceeding the text, it is not a 'bug', but the way in which the assembler handles the data from inside a macro I just thought that I'd mention it!

Error Messages and Reports

There is a comprehensive set of error messages which are detailed below In each case they are used when a direct command is issued or when an error is found during assembly, in this case the offending line number is shown together with the file in which it occured The error messages comprise of an error number, along with a summary of the error

00 INVALID COMMAND An invalid command has been typed in at the command level Use the 'H' command to see a summary of the editor commands available

01 INVALID HEX DIGIT A digit has been used after the '$' which is not in the range 0-F or the correct number of hex digits has not been used

03 NO OPCODE PRESENT - A line is found to have no opcode or directive to work with

03 LABEL REDEFINED A label has been defined more than once in the same source file

04 ILLEGAL ADDRESSING MODE There has been an attempt to use a 6510 instruction that is in the incorrect context Eg LDA ($0C), X will produce this error

05 NOT ZERO PAGE A 16 bit number has been used where an 8 bit expression was expected for example in immediate addressing mode or in the BYT directive

06 LABEL UNDEFINED There is found to be a reference to a label that you have not defined

07 INVALID INDEX – An index letter othat then X or Y has been used LDA $FB,Z will produce this error

08 BRANCH TOO FAR A relative branc has been used which exceeds the relative (-128/+127) byte limit.

09 UNDEFINED MACRO CALL - The macroname is trying to invoke a macro that has not been defined using the £ syntax

10 MACRO PARAMETER MISSING – A pre-defined macro definition is expecting a parameter to be passed to it when invoking it

11 FILENAME NOT FOUND/ I/O ERROR – This is the general failure of a command which reads data from a storage device If the file is not found you will be told, and when you have inserted the correct disk any key will allow the load operation to continue Pressing RUN STOP will abort, and give the above error message This allows for extremely large linked or included files to be chained as they don't have to be present on the same disk so you are not limited by the disk space

12 INVALID BINARY NUMBER A number following the '%' prefix does not contain a full set of 8 1's or 0's, or if other characters which are not '0' or '1' are used

13 DEVICE OFF LINE - The OUT directive has selected a device for output that is not connected to the computer or is not switched on

14 NESTED MACRO CALL – A macro that is being called or invoked is trying to invoke a macro

15 NESTED INCLUDE FILE – An included file is trying to use a DIN-INCLUDE directive within itself

16 NESTED INCLUDE/MACRO – An included file is trying to define a macro within itself ie £name command inside an included file

17 EXPRESSION OVERFLOW An expression is found to be over the 16-bit range ie (0 or) 65535

18 SYMBOL TABLE FULL The symbol table limit has been reached the configure program allows the start and limit addresses to be changed as required

19 MACRO DIRECTORY FULL As above but refers to the macro directory

20 MACRO LIBRARY FULL As above but for the macro library

The above example shows the conditional statements in action It gives A = 0 if flag = true, A = 1 if flag is false

The instructions STA 53280 and RTS will be assembled whatever the previous conditions permitted If assembly is turned off any further conditional statements must be on a separate line from a label

Take the following to be when the condition is currently in no-assembly mode

LABEL ENDIF ! will skip this line as LABEL is not to be defined, but the single line of ENDIF will work fine ie)
ENDIF ! alone is required

On any new usage of the editors 'A' command the conditional flag is automatically set to true assembly on

Syntax of Expressions

When hexadecimal numbers are used they must follow either $xx or $xxxx where x is a valid hexadecimal digit Any other combination of hex digits will fail any checks Only 8 bit binary is allowed but all 8 bits must be specified after the '%'

Additional Notes

Note that the assembler is set up for disk usage from device 8 Using disk as the medium allows the macro/include/SYM cmds to function These features of the assembler cannot be used with cassette The remainder of the assemblers functions remain intact for cassette users Disk commands list from disk, directory are of course disk specific

Editor commands which use filenames can be used with or without the quotes eg S "name" will be read the same as S name However pseudo opcodes in the source file which use filenames must be given with the open quote but you may skip the closing quote

More than one error may be found on a line, but may be related eg BNE ALAB will give "BRANCH TOO FAR' and also "LABEL UNDEFINED" if ALAB is not present, as it is trying to branch to an unknown destination

Getting it all in

Four Basic loaders are used to POKE in the main assembler code These are named BLOCK 1 BLOCK 4 RUN each of these programs in order and when the message BLOCK 4 OK is displayed enter as direct commands

POKE 43 0 POKE 44,110 POKE 45 0 POKE 46 160 SAVE "MACRO ASSEMBLER' 8 (Cassette users read ,8 as ,1)

Now reset, and load the assembler code back with LOAD "MACRO ASSEMBLER" 8 1 (cassette = ,1,1)

When READY appears type NEW followed by SYS 2#160 to initialise the assembler with a cold start

The configure program can be typed in and saved as usual with SAVE "CONFIG",8 This must have the main assembler code present before RUNning

A Simple Trace of the Link Directive

Take file below to be called "MAIN"

```
10 ! MAIN TOP LEVEL SOURCE
30 ! a few instructions
50 lda $dd0d
60 and # $fe
70 sta $dd0d
80 !
90 LINK "SOURCE2" ! link next file
```

```
10 ! This is the file called "SOURCE2"
20 NOP
30 NOP ! do nothing really
40 LDA BASICAD
50 LINK "SOURCE3" ! link next file
10! This is "SOURCE3"
20 BASICAD-43 ! give the label for
   the above files
30 RELINK "MAIN" ! loop back to
   the main file
```

When linking from cassette, you will be told to insert a file and press a key, this is due to the need of rewinding etc Linking from disk is automatic

As stated the TOP LEVEL SOURCE file is the only file in which a DINCLUDE directive can be used Its function is best used to set up a type of batch file, a small file which 'calls' the main bulk of the source a typical batch file could be

```
10 ! TOP LEVEL SOURCE FILE
20 OUT 3 ! sends output to screen
30 SYM "KERNAL SYM" ! reads
   symbols for the KERNAL routines
40 £OPEN MAC ! define a macro
   called 'OPEN MAC"
50 DINCLUDE "MAIN1" ! includes
   the main code part 1
60 DINCLUDE "MAIN2" ! includes
   the main code part 2
```

```
PROGRAM BLOCK1

97  10 REM C64 MACRO ASSEMBLER
       BASIC LOADER BY IAN GOFFE 1
       989 BLOCK 1 (2#160 31359)
S2  20 PRINT CCLR] "LI=100 FORA=
       2#160TO31359STEP16
D7  30 C=0 FORE=ATOA+15 READL C=
       C+L POKEE L POKES3280 L
60  40 NEXTE PRINT"CHOME]"LI
4F  50 READC: IFC<>CITHENPRINT"E
       RROR IN LINE "LI END
D4  60 LI=LI+10 NEXTA
AF  70 PRINT BLOCK 1 OK END
6F  100 DATA 32,85 159,160,0 173
       ,117,155 133 63 173 118,165
       133 64,169 1089
D5  110 DATA 255 145 63 200,169,
       255 145 63,173 67,131,133,63
       173 68 131,2234
74  120 DATA 133,64 160 0,169,25
       5 145 63 173 71 131 133 63 1
       73 72 131 1936
65  130 DATA 133,64,169 255,145
       63 96 169 255,133,204 32,60,
       229 169 71,2255
8E  140 DATA 180 111 32,52 131,1
       65 6 141,32 208,141,33 208 7
       8 67 157 1724
BB  150 DATA 165.7,133 1,169 13
       141 248 7 141 249 7 173 19,1
       31 240 1648
B4  160 DATA 3,32 41 147.32,171
       145,32 27 147 32,231 255 32
       204 255 1706
4E  170 DATA 169 13 162 0 134,19
       8 142,42 129 142 170 145 142
       72 147 142 1949
AF  180 DATA 19 131 142 255 148
       157,151,159 232 224,40,208 2
       48,162 0 32,2308
54  190 DATA 169,110 32,236 110,
       240 251 201 20 240 51,32 102
       145 157 151,2327
16  200 DATA 159 201 13,240,15,2
       32 76,146 110 169 13 32,162
       145,169 62 1364
52  210 DATA 32,102 145 96 162,0
       ,183 252 112 240 9,205 151,1
       59,240,25,2193
2C  220 DATA 232 76 102 110 169,
       205 160 111 32 52,131,76,80
       110,224 0,1854
27  230 DATA 240,132 202 32,102,
       145,76 146 110 138,24 42 170
       169 34,113,2035
7E  240 DATA 141 242 112 169,35,
       113 141 243,112,108,242,112
       138 72 32 228,2260
03  250 DATA 255,141 78,112,104,
       170,173,78,112 96,32 140 123
       169 2 141,1934
AC  260 DATA 130,155 32,25,128,1
       73 42 129,240 3,76,80,110,17
       3,21 128 1649
44  270 DATA 133,20 173 22,128 1
       33,21 32 19 169 169 95,164,9
       5,134 253,1755
B9  280 DATA 142,153 132,132,254
       140 154,132 163,1 141,171 1
       41,32 1 141,2036
81  290 DATA 165,197 201 63 208,
       5,169 1,141,79 112 173,75,11
       2 240,3 1946
9C  300 DATA 76,60,110,76 45 111
       ,96 165 54 53,49 48,47,48,50
       ,32 1130
0C  310 DATA 77,65 67 82 79 32 6
       5 83,83,69,77,66 76,69 82 32
       1104
D1  320 DATA 40 67,41 32,49 57 5
       6,57 32,73 46 71 79,70 70,69
       ,909
5F  330 DATA 50 54 49 49 49 32 6
       3,79,85,82,67 69,32,66 69 64
       ,1019
B6  340 DATA 65,83 32 70,82 69 6
       9,46,13 0,255,17,54,53,49,40
       ,1009
38  350 DATA 47 54 53 48,50,32,7
       7,65 67 82,79,32,65 83,83,69
       ,986
EC  360 DATA 77,68,76,69 82 32 4
       5,32 86 49 46,52 32,49,47 49
       86
A3  370 DATA 57,56 57 13 17,42 4
       2 32 40 65 83,83,32 49 32 42
       782
C3  380 DATA 42 0 13 17,42 42 32
       80 65 83,83 32,50 32 42 42,
       697
9A  390 DATA 0 13 17 69 82 82,79
       82 35,48,48 56,32 73 78 86,
       882
20  400 DATA 65 76 73,68 32,67,7
       9,77 77,65,78,68,46,17,0 13
       901
09  410 DATA 17,69 82 82,79,82,3
       5 49 50,58 32,78,79,32,79 80
       982
D8  420 DATA 67 79,68,69,32,80,8
       2 69,83 65,78 84,32,0,13 17
       922
27  430 DATA 69,82,82 79,82 35 4
       8,51 58 32,76,65,66,69,76,32
       ,1002
```

```
75  440 DATA 82,69,5F,69 70 73 7
8 F3,68,32 0,13,17 69 82 62
941
4B  450 DATA 73,62,35 48 54 50 3
2 76,65,66,65,76 32 85 76 6H
,1003
5B  460 DATA 63,70,73 76 63 60 3
2 0 0 0 0 240,0 224 0 0 523
CD  470 DATA 65 32,81 85 73,67,7
5 32,72,68,76 76 79 32 84 75
,1077
96  480 DATA 32 77 65 77 32,60 6
5 68 32,38 32,66,82,79 84 72
,989
FD  490 DATA 69 82 32,67,78 76,7
3 78 32,32,72,73,32 84 79 32
,992
EA  500 DATA 87,73 76 73 78,32,3
8 32,75,65 73 84,72,32,79,70
1029
8F  510 DATA 32,77,69,82,67 73 6
5,32,77,73 67 82 79 84,89 67
,1055
29  520 DATA 72 32,32 85,78 68 3
2 84,75,32,75,65,82,69,76,32
,575
31  530 DATA 36,32,84,65,82,65,4
4 32,65,78,68,32 79 70 32 87
,993
6D  540 DATA 75 05 62,83,65,32 3
2,32 32 77 89 32,83,69 76 70
,1022
24  550 DATA 32,45 32,73 65,78,3
2,71 78,70 70,69 32,33,33,33
,847
DD  560 DATA 33 32,71,73 75,68,6
6 85 65,32,72,65,67,75,65,82
,1048
54  570 DATA 33,32 182,145 65,65
 1,8 1,0,0 0 72,76,65 69 814
55  580 DATA 80,66 78,79,82 65,5
0 83,77 70 68 71 81,73,74 88
,1254
E5  590 DATA 0,48 49 50 51 52 53
 54 55,56 57 65 66 67 68,69,
850
E3  600 DATA 70 0 67 157 250 110
 225 115,235 124 44 129 249
110,60 151,2095
6D  610 DATA 142 151 84 152 148
 151,165 152 248 115 38 153 2
4 154 157 155,2177
7A  620 DATA 146 120 29 156,95 1
50 141,156 187,158,0,0 0,0 0
0 1348
72  630 DATA 0 0 160 0 173,72 14
7,208,13,173 28,147,201,1 24
0 6 1567
13  640 DATA 230,253 208 2 230 2
54 173 28 147,201,1,240,16,1
73 72,147 2373
B1  650 DATA 208 11,165,253 141
153,132,165,254,141,154 132
96 238,153 132 2520
55  660 DATA 208 3,238,154,132 5
6 173 73 113 201 32,240,63,2
01 45 240,2224
G8  670 DATA 55 201,43 240 61 20
1 13 240 57 162 0 189,77 113
201,33 1896
42  680 DATA 176 5 169 48 157 77
,113,232,224,4 208 239 162 0
189,17 2020
CA  690 DATA 113 205 77 113 240
5 232 224,16 208 243,32 52 1
14 96,160 2134
26  700 DATA 0 185 17 113 205 78
,113 240 32 200 192 16 208,2
43 32,52,1526
A8  710 DATA 114,96,173,77 113,1
41 79,113 173,78 113 141,80
113 169 48 1621
9F  720 DATA 141 77 113,141,78,1
13 76 153,113,140 33 113 130
24,42,42 1537
A7  730 DATA 42 42 24,109 93 113
,141 74 113 162,0,189,17 113
205,79,1456
51  740 DATA 113,240 9 232 224 1
6,208,243,32 52 114 96,160 0
185,17 1941
19  750 DATA 113 205,80,113 240,
9 200 192 16,208 243 32,52 1
14 96,140,2053
C5  760 DATA 33,113 134,24,42 42
,42 42 24 109 33,113,141 75
113,96 1180
1D  770 DATA 141,75,113 56 169,7
3 180 114 32 52 131,169,1 14
1 42 125 1638
A0  780 DATA 169,0 141 74 113 14
1 75,113,96 13 17,65 82 82 7
9 82 1346
1F  790 DATA 35,48 49 58 73 78 8
6 65,76 73 68 32 72 69 86 32
1002
51  800 DATA 68 73 71,73 84 32 0
 162 0,169,13 157 151 159 23
2 224 1688
43  810 DATA 40 208 248,162,0 32
,169 110 32,236,110,240,251,
201,20,240,2299
A2  820 DATA 15 32,182,145 157 1
51 159,201,13,240,4,232,76,1
20,114 96,1937
87  830 DATA 224 0,240,228,202 3
2 182 145 76 120 114,162 0 1
83 151 159 2224
D4  840 DATA 157 205 115 232 224
,6 208 245,32 23,115 169 36,
32 182 145 2126
D8  850 DATA 173,202 115 32 215,
114,173 77,113,32,182 145 17
3,78 113,32 1565
93  860 DATA 182 145 173 201 115
,32 215,114 173 77,113 32,18
2,145,173,78,2150
B8  870 DATA 113 32,182,145,76 8
0 110 72 160,0 140,21,115 14
0,22,115 1523
E7  880 DATA 201 16 144 16 24 74
 74 74,74,141 22 115 56,10,1
0,10 1061
D3  890 DATA 10,141,21,115,104,5
6,237 21,215 141,78,113,173
22,115 141 1603
EC  900 DATA 77 113 174,77,113 1
80 17,113 141 77,113,174 78
113,189 17 1775
1D  910 DATA 113 141 78,113,96,0
,0 155 0 141 201 115 141 202
115,169 1794
A7  920 DATA 48 162 0 157,215 11
5 232,224 6,208,248,162 0 18
5,205,115,2288
A9  930 DATA 201 43 240 16,201,4
5,240,12 201 32 240 8 201 13
,240 4 1337
02  940 DATA 232 76 45 115,142,7
5 115,169,5,56,233,0,170,160
,0 185,1778
58  950 DATA 205,115 157,215,115
,200,232,224,6 208,244,162 1
6 160,35,142,2440
1A  960 DATA 203 115 140,204 115
 173 215 115 32 172 115 162
232 160,3 142 2298
76  970 DATA 203 115 140 204,115
,173,216 115 32 172,115,162
100,160,0 142 2164
34  980 DATA 203 115 140,204 115
 173 217,115 32 172 115 162
10 160 0 142,2075
52  990 DATA 203,115 140 204,115
,173 218 115 32 172 115,162
1 160,0 142 2067
70  1000 DATA 203 115 140 204 11
5,173,219,115,32 172,115 96
56 233,48,240 2278
5A  1010 DATA 23 170 173,201,115
,24 109 203 115 141 201,115
173,202,115 109 2185
BA  1020 DATA 204 115 141,202 11
5 202 208,234 56,0 0,0,0 48
48,48 1661
EF  1030 DATA 48,48 68 68 68,68
 68 48 48,48 48 48 68 68,80 0
8,1128
60  1040 DATA 88,165 139 160 111
,32 52 131 162 0 142 40,208
169 215,120,1958
AD  1050 DATA 157 64,3,232,224,6
4 208,245 169,65,141 249,112
,141,245 112 2426
DE  1060 DATA 174 67,131,172,68
 131,142 74 112,140 75,112,17
4,71 131 172,1946
23  1070 DATA 72 131,142 76,112
140 77 112 169 255,141 139 1
11 169 0 141 1566
FD  1080 DATA 72,112 141,73 112
141,26,147 141 255,148,141 1
71,141,141,18,1960
E2  1090 DATA 131 169 1,141 15 1
31 169 0 141,42,129 141 28 1
28 32 148,1550
05  1100 DATA 123 174 117 155 17
2 116 155 142 119 155,140 12
0 155 159,0 32 2046
8C  1110 DATA 156,120 169,255,32
 158,128,173 117,155,141,119
,156 173 118 155 2414
B0  1120 DATA 141,120,155,165,19
7 201 63,208 12,169,117 180
131 32 52,131 2054
F6  1130 DATA 169 1 141 42,129 1
68 0 141,18 131 141 21 131 1
41 43 129,1547
F3  1140 DATA 173,42,129 240,6 3
2 231 255 76,60 120 32 1,141
,173,79 1750
5C  1150 DATA 112 240,54,173 255
,148,240,11 169 0 141,255 14
8,141,79 12 2278
07  1160 DATA 76 55 116 173 28,1
47 240 11 32 41 147 169 0 14
1 79 112,1809
60  1170 DATA 76 55 116 173 72 1
47,240,11,32,27 147 169 0 14
1 79 112,1641
BF  1180 DATA 76,55,116 76 133 1
17 78 193,117 173 138 111,24
0 30 174,21 1950
43  1190 DATA 131 189 151 159 20
1,33 240 139 201 82 208,6 32
111 147 76 2116
BF  1200 DATA 59 116,201 64 208
6,32 107 149 76 55,116 32,20
1,121,205,1832
28  1210 DATA 151,159 173 218 12
4,201,65,208,32,238,130 155
32 29,128,189 2212
```

```
02  1220 DATA 0 141,136,111,173,
21 128,208 8 173,22,128,208,
3,76,99 1537
08  1230 DATA 116,169,255,141 13
8,111 76,99,116,201,56,240,6
,201 67,240 2242
0D  1240 DATA 2,208,6 32,99,146
76,33 116,173,138,111,208,6,
32 99,1551
98  1250 DATA 146,76,99,116 173,
218,124 201,255,208,3,76,156
,121,201 60,2241
0B  1260 DATA 208,3,76,103 144 2
01,69 208 3,76,8,145,201,70
208,3 1726
25  1270 DATA 76 66,145 201,71,2
08 3 76,99,116 201,72 208 3
76 99,1720
46  1280 DATA 116 201,62,208,6,3
2 226 145 76 99,116,201 63,2
08,3 76 1840
24  1290 DATA 99 116,201,73 208,
6,32,228 145 76,183 117,201,
74 208,6 1863
CD  1300 DATA 32 131,146 76,99 1
16,201 75,208 6 32,128,156,7
6,99,116 1638
AF  1310 DATA 201 61 208 23,169,
1,141 28,128,32,28,128,173,2
1 128,141 1612
D1  1320 DATA 26,128,173 22,128,
141,27 128 76,99,116,201,64,
208,15,230 1790
A8  1330 DATA 130 155,32,28,128,
32 23,121 32,93,121,76 99,11
6,76,99,1312
8A  1340 DATA 116 169 134,160,11
1,32 92,131 169,0,141 40,208
,169,65,141,1838
11  1350 DATA 244 112,141 245,11
2,169 2 141,18 131,169 255 1
41,138 111 32 2162
58  1360 DATA 146,123 165 187 20
1 63 208,12 169,1,141,42,128
,169 117 160 2045
6A  1370 DATA 131 32,92,131 169,
0,141 18,131,173,42,128,240,
6,32 231 1658
F0  1380 DATA 255,76 60 120,162,
0,142 43,128,160,0 32 1 141,
173,78 1573
A5  1390 DATA 112 240,54,173,255
,146,240 11 169 0,141,255 14
8 141 78,112 2278
EF  1400 DATA 76 226,117 173 26,
147 240 11,32 41,147 169,0,1
41 78 112,1737
25  1410 DATA 76,226 117 173 72
147 240 11,32,27,147,169 0,1
41 78 112 1769
82  1420 DATA 76 226,117,76,155,
132 76,155,132 169,0 141 21,
131 173 138,1818
36  1430 DATA 111 240 24 174,21,
131 189 151,155 201 33,240,1
33 201,32 240 2340
D8  1440 DATA 128,201 64,208 6,3
2,107,148,76 226,117 169,0 1
41 130,155 1810
D6  1450 DATA 32,201 121 173,219
,124,201,85 208 32,238 130,1
55 32 28,128 2087
81  1460 DATA 169,0 141 138,111
173,21,128 208,8,173 22,128,
208,3,76 1707
94  1470 DATA 226 117 169,255 14
1,138,111,76,226 117 201 66,
240,6 201,67,2357
4C  1480 DATA 240,2 208,6,32 99
146 76,226 117 173 138,111 2
08 6,32 1820
C0  1490 DATA 99,146 76,226 117,
173,219 124 201 74,208 6 32,
131 145 76 2053
8C  1500 DATA 226 117,201 75,208
,3,76,226 117 201 255,208,3,
76 203 113 2314
AE  1510 DATA 201,44 240 10 201
47,240,6,201,48 240,2 208,3,
76 30 1797
A7  1520 DATA 131 201,25,240 31
201,28 240 27 201,27 240 23,
201,26 240 2082
51  1530 DATA 13,201,29 240,15,2
01,30 240 11 201 31,240 7,20
1,32 240,1939
86  1540 DATA 3,76 7 115,78,42 1
31 201 68,208,3,76 103 144 2
01 69 1527
AF  1550 DATA 208 3,76 6 145 201
,70,208,3 76 66 145 201,71 2
08,3,1692
78  1560 DATA 76 226 117,201,72
208,3 76 226 117,201 62 208
8,32 228,2058
11  1570 DATA 145 76,226,117 201
63 208 3,76 226,117,201 73
208 6 32,1976
5C  1580 DATA 228 145 76 155,132
201 61 208 23 32,28 128 173
,21 128,141 1861
48  1590 DATA 26 128 173 22 128
141 27 128 169,1,141,28 128
76 226 117 1659
FE  1600 DATA 201 64 208 15,238,
130 155 32 28 128 32 23 121,
32 43,121,1572
D1  1610 DATA 76 226 117,174 218
,124 189 86,138,201,255,240
6,32,128 128,2333
6E  1620 DATA 76 226,117 238,130
,155 174 130,155,169,151 159
201 35 240,30 2406
E5  1630 DATA 32,59 128 173 128,
120,240 31,201 2,240 9 32 12
9 128 32 1692
6D  1640 DATA 125 128,76 226,117
32 128 128 32 125 128 76 22
6 117 32,128 1834
85  1650 DATA 128 32 125 128 76
226 117 32,29 128 32 128 128
32 125 128,1603
6E  1660 DATA 173 22 128,240 3,3
2 128 128,76,226 117 173,18
131 240 15 1851
18  1670 DATA 169,1 141,42,125 1
69 233 160 111,32,52 131,76
226 117,169 1964
D3  1680 DATA 0 141,18 131 32 16
6 123 173,18 131 208,3 76 22
6 117,173 1736
83  1690 DATA 43 125 141 21 131
76 79 110 32 171 145 169 3 1
41,170 145 1713
EA  1700 DATA 32 171 145 32 231
255 32,148 123,169 1 141 171
,141 32 121-1945
6F  1710 DATA 155 32,180 145 173
42 125,240 6 32 27,147,76 8
0 110 32 1625
88  1720 DATA 1,141 165,187 201
63,208,5 169 1,141,75,112,17
3,73 112,1647
C6  1730 DATA 240,237,32 27,147,
76 80 110 73 78,32 0,165 56
160 120,1637
76  1740 DATA 32 52 131,174 248
112,173 249,112,32,205,188 1
73,26 147,204,2283
A5  1750 DATA 8 173 72,147,208,3
76 55,120 153,136 160 120,3
2 52,131 1708
80  1760 DATA 32 237 148 169 13
32,210 255 173 249 112 174,2
48 112 32,205 2401
E0  1770 DATA 162 169 32,32 210
255 162 0 189,151 159 32 210
255 201,13 2258
7C  1780 DATA 240,3,232,208,243,
76 80 110 13 73,78 32,70,73
76 68,1676
FD  1790 DATA 58,0 173 73,112,20
8 10,168 181,160,120 32 52 1
31 76 80 1635
D8  1800 DATA 110 173 175 120,17
2 180 120 141,174 180 140 17
5,120 32 255 255 2466
5F  1810 DATA 76 80 110 0,0,13 7
8 79,32,69 82,68,67 85 84 73
,1003
E2  1820 DATA 78 78,32 65 68 68
82 69 83,83 32,83,80 63,67 7
3 1111
34  1830 DATA 70 73 68 68 32 13,
0 0,0 0,127,255 254 64 0,2,1
027
EE  1840 DATA 79 255 248 79 255,
242 79,255 246 79 255 246 79
231 242 79,2493
12  1850 DATA 195,242,79 195 242
79 231,242,79 254 242 79,23
1 242 79,231,2542
5D  1860 DATA 242 79,231 242 79
231 242 79 231,242 79 255 24
2 64 0 2 2540
F8  1870 DATA 127 255,254 0 0 0
5 24 173 26 128 103 21 126 1
41 26 1417
82  1880 DATA 128,173 27 128 103
22 128 141 27,128 96 24 173
98,131,109 1642
A5  1890 DATA 21 128 141 58 131
173 99 131,103 22 128 141 99
131,86 13 1661
D2  1900 DATA 69 82 82 79 82 35
48,50 58,73 78 88,65 76 73 6
8 1105
60  1910 DATA 32,68 73,78 65 82
85 32 78 85 77 66,69,82 32 0
1006
32  1920 DATA 13 69 82 82 79 82,
35,45 55 58 69,88 80,82 55,8
3 1075
E4  1930 DATA 83 73 79 78 32 79,
88,69 82,70 76 79 97 32,0 13
,1019
4C  1940 DATA 69 82 82 79 82 35
43 66,58 62,80 77 69 79 76,3
2 1004
4F  1950 DATA 84 65 68 76,69 32
70 85 76,78 32,0 173,18 131
240 1259
20  1960 DATA 15 165 1,141 42 12
9 169 233 160 111 32,52 131,
76,55,116 1682
54  1970 DATA 165,0 141 18 131 3
2,168 123 173 18,131 208 3,7
5 55 116 1806
C8  1980 DATA 173 43 125 141 21
131,76,201 116,165 82 141 24
4 121,141,6 1935
CE  1990 DATA 122 141 42 122 169
122 141 245 121 141 6 122 1
41 43,122,160 1960
4F  2000 DATA 0 162 0 142,218 12
4,172 21 131 140,130 155 165
151 159 200 2090
38  2010 DATA 238 130 155 221,82
,122,206 49 232 208,9 239 24
5 121,238 6 2502
4F  2020 DATA 122,238,43 122,165
82 122,201,13,208 225 165 1
51 159,201 32 2283
```

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44  2030 DATA 240 13,201 33,240
    15,201 13 240,11 173,216 124
    201 61 240 2230
6A  2040 DATA 4 201 47 208 39 17
    3 216 124 96 189 82 122 232
    208 8 238 2190
3B  2050 DATA 245 121 238 6 122
    238 43 122 201,255,240 16 20
    1 13 208 233,2502
0B  2060 DATA 238 216,124 172 21
    131 140,130 155 76 236,121
    163 255 141 216 2545
C8  2070 DATA 124 36 65 66 67,13
    ,65 78 68 13 65 83,76 65 13
    65 1024
29  2080 DATA 83 76 13,66 73,84
    13,67 77,80 13 67 80 88 13 6
    7 960
AB  2090 DATA 80,85 13 68 63 67,
    13 65 75,82 13 73,78 67 13 7
    8 949

PROGRAM BLOCK2

E0  10 REM CBM64 MACRO ASSEMBLER
    BASIC LOADER BY IAN GOFFE 1
    983 BLOCK 2C31360-3455B3
50  20 PRINT [CLR] L1=100 FORA=
    31360TO34558STEP16
D7  30 C=0 FORE=ATOA+15 READL:C=
    C+L POKE E,L POKE53280,L
B0  40 NEXTE PRINT [HOME] L1
4F  50 READC1 IFC<>C1THENPRINT E
    RROR IN LINE  L1 END
04  60 L1=L1+10 NEXTA
AE  70 PRINT"BLOCK 2 OK   " END
50  100 DATA 69 65,13 76 68,88 1
    3 76 68,83 13,76 83 82 65 13
    ,958
17  110 DATA 76 83,82,13 73,82,6
    5,13 82 79,76,65 13 62 79 76
    1045
F6  120 DATA 13,82,79 82 65 13 5
    2 79 82 13 83 66,67,13 83 84
    986
2F  130 DATA 65,13 83,84 88 13 8
    3 84,83 13 66 80 76,13 66 77
    993
7C  140 DATA 73 13 66 86,67 13 6
    6 86 83 13 66 67 67 13 66 87
    912
F6  150 DATA 83 13 66 78,69 13,6
    6 69 81,13 84 84 65 13,84 65
    ,950
62  160 DATA 88 13 84,69 65,13 8
    4 65 83 13 84 83 80 13 84 88
    ,1043
C5  170 DATA 83 13 80,72 80 13 8
    0 76 80 13 80 72,65 13 80 76
    976
D3  180 DATA 65 13 66,82 75 13 7
    4 83 82 13 82 84 73 13 82,84
    984
9B  190 DATA 83 13 74 77 80 32 4
    0 13 74 77 80 13 70,79,80 13
    906
70  200 DATA 67 76,67 13 83 83 6
    7 13 67,76-73,13,83,69,73 13
    922
7F  210 DATA 67 75 86,13,67,76 6
    8 13 83 69,68,13,68 69,83 13
    938
3A  220 DATA 73 78,89,13 68 69 8
    8 13,73,78 88 13 42,61 13,76
    935
14  230 DATA 73 78,75 13,82,85,7
    8 13 82 69 83 13 73 70 13 69
    ,969
DD  240 DATA 78 88 73 70 13 69 7
    6,83 69,13,66 88,84,13 87,73
    ,1030
73  250 DATA 82,13 84 89,84,13 7
    8,79 65 66 13 79 85 84 13,82
    ,1008
D6  260 DATA 65 76 73,78 75,13 6
    8 73,78 67,76 65 68,69,13,63
    ,1064
D3  270 DATA 84 77 13 255,160 0,
    141 75,112 162 1 160 8,134 2
    53 132 1785
D7  280 DATA 254 142 153,132,140
    154 132 86 160 0 162,0,173,
    255,148 240 2341
BC  290 DATA 14 173 244 112,141
    162 112 173 245 112 141 163
    112 160 2,169 2255
77  300 DATA 151 158 201 13 240
    20 201 32,240 16 201,61 240,
    12 201 33,2021
16  310 DATA 240,8 153 182,112 2
    32,200 78 151 123 169 13,153
    ,162 112 142,2240
1F  320 DATA 51,131,32 181,129 1
    73 19 131,201 1 208 18,173 2
    3 128 240,1849
59  330 DATA 13,169 1,141 42 129
    169 14 160 112 32 52 131,96
    ,173,19 1453
4G  340 DATA 131,201,1 240,3,76
    22,131,162 0 173,255,148,240
    12 173 1968
9C  350 DATA 244,112,32 198 128
    173,245 112,32 190,128 189,1
    51,169,201,32 2334
B5  360 DATA 240,15,201,61 240 1
    1 201 13 240 7,32 198 128 23
    2,76 27,1922
8A  370 DATA 124 142,43 128 238
    43 129 189,151,158 201 61 24
    0 92,201 32 2174
BF  380 DATA 240 13 169 1 141 42
    129 169,233 160 111 32 52 1
    31 96 169,1804
B1  390 DATA 1 141 18 131 173 28
    128 208 15,189 1,32 198 128
    32 146 1548
B7  400 DATA 128 32 146 128,32,2
    18 124 50,160,1,141 18,131,1
    73 19 131,1688
59  410 DATA 173 19 131 32,198 1
    28 173 72,112 240,15,173 50
    131 32 198 1325
29  420 DATA 128 173,89,131 32 1
    98,128,76 150 124 173 29 128
    32 198 128,1924
3A  430 DATA 173 27 128 32,198,1
    28 32 219,124 56,174 43 129
    160 0 189 1852
93  440 DATA 151 153,201 32 240
    12 201 13,240 8 153,217 128,
    232 200 76,2263
66  450 DATA 159,124,169 13 153,
    217 128,32 219 124,32,79,125
    ,173 23 128,1898
E4  460 DATA 240,3 76 89 124 169
    2,32,198 128 173 21 128,32
    198 128,1741
D4  470 DATA 173 22 128 32,198,1
    20 32,219 124 36,0 173,15 13
    1,201 1 1677
19  480 DATA 200 8 169,255 32 18
    8 128,32,183 128 96,162,0 18
    9,153 159 2100
D7  490 DATA 157 217 128,232 224
    40 208 245,32 79,125 174,21
    128,173 22,2205
7D  500 DATA 128,32 205 189 169
    13 32 182,145 173 36 32,182,
    145 173 22 1854
BA  510 DATA 128 32 215 [illegible]4 1 3
    77 113 32 182,145 173 78 113
    ,32 182 145,1834
73  520 DATA 173 21,128 32 215 1
    14,173,77 113 32 182 145 1[illegible]
    ,78 113,32 1801
25  530 DATA 182,145 78 80 110 2
    38 20 128 174,20 128 189 217
    128 141 201 2177
0M  540 DATA 115 169 0 141 202 1
    15 238,20 128 32 165,128 76
    98 125,169 1920
4D  550 DATA 0 141 20 128,141 25
    ,128,141,21 128 141 22 128 1
    41 23,128 1456
58  560 DATA 141 24,128,173,23 1
    28,240,3 76 44 128 174 20 12
    8 188,217,1834
A1  570 DATA 128 201 32 240,72 2
    01 33 240 68 201,41 240 84 2
    01 13,240 2215
8E  580 DATA 80 201 41,240 56 20
    1,43 240,80 201 44,240 48 20
    1 45 240 2181
D2  590 DATA 83 201 38 240 160 2
    01 38 240 86 201 64 240,53,2
    01 84 240 2421
45  600 DATA 100 201 50,208 3 76
    ,69 125,201 62,208,3 76 80 1
    26 201 1800
0E  610 DATA 36,208 3 76 42 127
    201,37,208,5,76 159 127 76 1
    8 128 1523
8C  620 DATA 201 46 240 8 201 81
    176 7 201 65 144 3,76,50,13
    0 201 1640
77  630 DATA 42,208 3 76 247 127
    ,76 51,126 238 20 128 169 0,
    141 25 1717
38  640 DATA 128 76 89 125 238,2
    0,128,169 1 141 25,128 76 89
    125 238 1816
9A  650 DATA 20,128 169,2 141,25
    ,128 76 89 125 238 20,128 16
    9,3,141 1612
6C  660 DATA 25 128,76 89 125,23
    8 20,128 169 4,141 25,128,76
    ,89 125 1608
24  670 DATA 173 24,128 240 23 2
    01 2 240 6 169 0 141 22 128,
    76 44,1619
53  680 DATA 126 173 22 128 141
    21 128 169 0,141,22 128 173,
    19 131 201 1723
D1  690 DATA 1,240,17 173 23 128
    240 12 162,43,160 112 32 52
    131 169 1702
A3  700 DATA 1 141 42 128 96 169
    ,1,230 20 128,141 24 128 76
    89 125 1558
CB  710 DATA 183,2,230,20 128 14
    1 24 128 76 53,125,174,20,12
    8 160 0,1632
0C  720 DATA 189 217 128 201 13
    240 48,201 43,240 44,201 45,
    240 40 201,2281
F6  730 DATA 32 240,36 201 44 24
    0,32 201,33 240 28 201 41 24
    0 24 201 2034
90  740 DATA 38 240,20 201 64,24
    0 16 201 94 240,12 153 205,1
    15 232 200 2271
90  750 DATA 238 20 128 192,5 20
    8 201,165 32 153 205 115 32
    23 115,32 1060
2A  760 DATA 165,128 76 53,125 1
    73 25 128 201 1,240 34 201 2
    240,52 1899
96  770 DATA 201 3,240 67 201 4,
    240 82 173,201 115 24 109 21
    128 141 1950
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43  780 DATA 21 128 173 202 115
    103,22,128 141 22,128 176,80
    ,96,173 21 1735
86  790 DATA 128,56,237,201 115
    141,21 128,173,22 128 237,20
    2,115 141,22 2067
84  800 DATA 128 144,58 96,173 2
    1,128 45,201 115 141 21,128
    173 22 128,1722
37  810 DATA 45,202 115 141,22,1
    28 96,173 21,128,13 201,115
    141,21 128,1680
1A  820 DATA 173 22 128 13,202,1
    15 141 22,128 56,173 21,128
    77,201,115 1755
52  830 DATA 141,21 128,173 22,1
    28 77 202 115 141,22 128 96
    163,96 160 1619
1A  840 DATA 121,32 52,131,169 1
    ,141,42 128 96,162,0,172 20,
    128 165,1581
65  850 DATA 216 128,157 77 113
    200,232,224 4 208,244,230 20
    128 174,20 2385
0C  860 DATA 120 165,218 128 201
    32,240 51,201 45 240 47 201
    43 240 43 2248
71  870 DATA 201,30 240,39 201 6
    4,240,35 201,94 240,31 201 1
    3,240 27,2105
85  880 DATA 201,33,240 23,201 4
    1 240 15,201,44 240 15,238 2
    0,128 238,2122
52  890 DATA 20 128 238 20,128 2
    38 20 128,76,137,127 238 20
    128 236 20 1504
DO  900 DATA 128,169,32 141,79 1
    13,141 60,113,32 134,113 173
    75 113 141,1777
74  910 DATA 201 115 173,74 113
    141 208 115 132,165 126 76 88
    125,238 20,2015
1E  920 DATA 128,174,20,120,160
    0 105 217 128 153,12,128 232
    ,238 20,128 2055
5D  930 DATA 200 192 6 208 241 3
    2 160,127 32,165,126 76 89 1
    25 162,0,1503
F8  940 DATA 142 201,115 142 202
    ,115,162 8 169 11 128 201 45
    240,15 201 2121
FO  950 DATA 48 208,23 173 201 1
    15 24,106 141 201,115 76 230
    127,173 201 2162
13  960 DATA 115 56 106 141,201
    115 202 208,223,96 169 63 16
    0,121 32,52 2060
DE  970 DATA 131,169 1,141,42 12
    8 96 173 26 128 141 201 115
    173 27 128,1821
78  980 DATA 141,202 115 32 165
    126 238,20 128 76 89,125 48
    48 48 48 1655
3F  990 DATA 48 48,48 48 0,0,0 0
    0,0,80,155 0 174,130 155 32
    8
E7  1000 DATA 160 0 189,151 153
    201 13 240,9,153,217 128 232
    ,200,192,80,2324
80  1010 DATA 208 240,169 13 153
    ,217 128 32 79,126,36,169 0
    141,128 128 2028
14  1020 DATA 162 0,189 151 153,
    201 33,240 25,201 13 240 21
    201 41,240 2117
57  1030 DATA 4 232 76 66 128,20
    2,189 151,153 201 88 208 6 1
    69 1,141,2021
73  1040 DATA 128,129 96 232,232
    ,232 189 151 153 201,89 208
    6 169 2 141 2363
82  1050 DATA 128 128 96 169 225
    160 131,32,52 131 163 141
    42 129 96 1830
B7  1060 DATA 0 230 98 131 208 3
    ,230 99 131 238 26 128 208 3
    230 27 2014
98  1070 DATA 128,96 238 119 155
    ,208 3 238 120 155 173,119 1
    55 205,65,131,2308
0C  1080 DATA 208 20,173 120 155
    ,205 66 131,208 12 169 127 1
    60 121 32 52 1959
8F  1090 DATA 131,169 1 141 42 1
    28 96 56 173,119 155 233 1 1
    41 119 155 1861
F8  1100 DATA 176 3 206 120 155
    96,172 119 155,140 211,128 1
    72 120 155,140 2288
37  1110 DATA 212,128 141 255 25
    5 32 146,128 96 32 32 32 32
    32 32 32,1617
01  1120 DATA 32 32 32,32 32 32
    32 32 32 32 32 32 32,32 32 3
    2 512
58  1130 DATA 32 32 32 32,32 32
    32 32 32 32 32 32 32 32,32 3
    2 512
ED  1140 DATA 32,32 32 32,32 32
    32,32,32,32,32,32 32,32 32 3
    2 512
F7  1150 DATA 32 32,32 32,32,32
    32 32 32 32 32,32,30,32,32 3
    2 512
E0  1160 DATA 32 32 32 32 32 32,
    32 32 32,13 0 0 160 0 174 11
    7 752
D2  1170 DATA 155,173 116 155 13
    4 251 133 252 169 3 141 170
    145,32 123,145,2230
58  1180 DATA 160 0 32 75 131 20
    1 255,240 17 201 1 240 16 20
    1 2 240 2012
1A  1190 DATA 17 32 182 145 32 1
    88 129 76 94 129 76 80 110 1
    69 42,32 1483
7E  1200 DATA 182 145 169 32,38
    182 145 32,188 189 32 168 12
    8 32 75 131 1783
4A  1210 DATA 32,215 114 173 77,
    113,32 168 145 173,78 113 32
    182 145 32 1638
67  1220 DATA 177 128 32 75,131
    32,215 114 173 77 113 32 182
    ,145 173,78 1878
DA  1230 DATA 113 32,182 145,32
    168 129 32,168 189,169 13,32
    ,182 145 169 1636
28  1240 DATA 187 201 63 208 156
    76 80,110 230 251 208 2 230
    252,160 0 2423
9A  1250 DATA 98 56 165 251 233
    1,133,251 176 2 198 252 160
    0 56 160 2230
98  1260 DATA 0 173 117,165 133,
    251 173 118 155 133 252,162
    0,160 0 32 2014
2F  1270 DATA 75 131 201 255 240
    ,74,201 1 240 14 201 2 240 1
    0,157 80 2122
32  1280 DATA 112,232 32,168 129
    76,207,129 168 13 157 80 11
    2 160 0,185 1061
78  1290 DATA 162 112,201 13 240
    12 217 80 112 208 4 200 76
    239 129 76 2081
F9  1300 DATA 38 130 185 80 112,
    201 13 208,29 169 1 141 23 1
    20 173 13,1650
74  1310 DATA 131 201 1 240 10 1
    66,251 141,118 155 165 252 1
    41,120 155,96,2343
38  1320 DATA 169,0,141 23 128 9
    6 32 168,129,32 168 129,32 1
    68,129 76 1620
2D  1330 DATA 203 128,165,0 141,
    23,128 174,20 128,160 0,173
    255 148 240 2081
60  1340 DATA 28 185 217 128 201
    46,208 7 232 238,20,128,76
    93 130 173 2114
D5  1350 DATA 244 112 141 162,11
    2 173 245 112,141,183 112 16
    0 2 185 217,128 2413
51  1360 DATA 201 13,240 43 201
    43,240 39 201 45 240 35,201
    32 240 31 2045
5C  1370 DATA 201,44 240 27 201
    41 240,23 201,64 240 19 201
    94 240 15 2031
81  1380 DATA 201,36 240 11,153
    182 112,232,238 80 128 200 7
    6,93 130 169 2203
78  1390 DATA 13 153,162,112 160
    0 173 117 155 133 251 173 1
    18 155 133 252 2280
88  1400 DATA 182 0 160 0,32 75
    131 201,255 240 83 201 1 240
    ,14 201,1896
D9  1410 DATA 2 240,10 157 80 11
    2 232 32 168 129 76 184 130
    169 13,157 1871
DA  1420 DATA 80 112 160 0 185,1
    62 112 201,13 240 12 217 80
    112 208 4 1898
4A  1430 DATA 200 76 136 130 76
    6 131,165 80,112 201 13 208
    40 168 0,1823
22  1440 DATA 141,23 128 32 168
    129,32 75 131,141 201,115 32
    ,168 129 32 1677
AC  1450 DATA 75 131,141 202 115
    32 168 129 32 165 128,76 99
    125 168 1 1766
05  1460 DATA 141 23 128,76 88 1
    25 32,168,129,32,168 129,32
    168,129 78 1655
D8  1470 DATA 160 130 0 0,0 0 20
    1 2 174 51 131,76 49 124 32,
    128,1253
C6  1480 DATA 128 32,129 128 32
    129 128 76 226 117 32 129 12
    8 32 129 128 1703
48  1490 DATA 76 226 117 0,72 15
    2 72 32 231 255 104,168 104
    32 30 171 1842
6F  1500 DATA 96 255 181 0,240 2
    55 255 0 224 255,239 120 169
    44 133,1 2477
1E  1510 DATA 177 251,141 74 143
    169,55 133,1 173 74 143 88
    96 0 0 1718
F3  1520 DATA 0 0 0 0 0 13 13 42 4
    2 32 60 85 83 83,32 51 32,56
    8
H7  1530 DATA 42 42 13 13 0 13 1
    3 88,82,69 65 75 32 79 85 84
    773
14  1540 DATA 32 79,70,32 65 83
    69 65 77 66,78 83 32 0,32 32
    817
01  1550 DATA 32 32,32,32,32,32,
    32 32 32 32 32,32,32 32 32 3
    2 512
88  1560 DATA 32 32 32 32 32 32,
    32,32 32,32 32 32 32 32 32 3
    2 512
8D  1570 DATA 32,32 32 32 32,32,
    32 32,32,32 32 32 32,32,3
    2,512
A7  1580 DATA 32 32,32 32 32,32
    32,32 32 32 32 32 32 32,32 3
    2,512
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86  1550 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 1
    3 493
85  1600 DATA 0 13 69,82 82 79 8
    2 35 48 52 58 32,73,76 76 64
    ,526
AB  1610 DATA 71 65,76 32,65 68
    69 82,69,83 83 73 78 71 32
    7 1093
6B  1620 DATA 79 68,69 32,0,13 6
    9 82 82,79 82 35,48 53,50 32
    ,681
9A  1630 DATA 76,73,84 32,90 69,
    82 79 32 80 65 71 69 32 0 13
    355
2C  1640 DATA 69,82 82 79 82,35,
    48 55 50,32,73 78 86,65 76 7
    3,1073
4C  1650 DATA 68,32 73,78 68 69
    68 32 0 13 69 82 82 79 82 35
    850
E8  1660 DATA 48,50,58,32 66,82,
    65 78 67 72,32,84,78 79 32,7
    0,1000
45  1670 DATA 65 82 32 0 13 69 8
    2 82,79 82,35 48,57,58 32,85
    901
33  1680 DATA 78,68,69 70,73 78
    69 68 32 77,65,67 82 79 32 6
    7 1074
A0  1690 DATA 65 76 76 32 0 13 6
    5 82,82,73,82 35 49 48 58 32
    878
8A  1700 DATA 77 65 67,82 79 32,
    80 65,82 65,77 69,64 69 62 3
    2 1107
F3  1710 DATA 77,73,83,83,73,78
    71 32 0 0,0,169 100,160 131,
    32,1182
56  1720 DATA 52,131,169 0 141 4
    0 208,169 65 141 244 112 141
    245 112 32 2002
5A  1730 DATA 231 255 169 3,141
    19 131 169,0 141,170,145 141
    ,224,131,169 2238
1E  1740 DATA 255 141,138,111 32
    ,148 123,169 197,201,63 208
    12,169 117,160 2240
C9  1750 DATA 131 32 52 131,169
    1 141 42 123,169,0 141,148 1
    38 173 42 1633
31  1760 DATA 125 240 6 32 231 2
    55 76 60,120 173,224 131,208
    3 76 110 2074
F9  1770 DATA 133,169 32,32,102
    145 169 0 141,21 131 32 201
    121 173 210 1900
6C  1780 DATA 124,201 255 240 23
    169 0 141 130,155 169 22 56
    ,237 226 145 2293
D8  1790 DATA 168 169 32,32 102
    145 136 208 250 76,93,133 18
    3 14 56,237 2100
CD  1800 DATA 226 145,168 169,32
    32,102 145 136,208,250 162,
    0,142 130 155 2262
C3  1810 DATA 189 151,159 201,13
    208 3 76,110 133,201 61 240
    21 201 32,1859
55  1820 DATA 240 17,224 7 176 3
    32 102 145,174,130 155 232
    142 130,155,2144
F5  1830 DATA 76 48 133 201 32 2
    08,3 238,130 155,76 10 133 1
    74 130,155,1902
68  1840 DATA 189,151 159 201 13
    240,7 32,102 145 232 76,96
    133,173 224,2253
27  1850 DATA 131 240 46 169,13
    32 102 145,173 27 128,32 215
    114,173 77 1897
A5  1860 DATA 113 32 102 145 173
    76 113 32 102 145 173 26 12
    6 32 215 114 1883
79  1870 DATA 173,77 113 32 102
    145 173 76 113 32 102 145,18
    9,32 32 182,1860
6C  1880 DATA 145 169 0,141 10 1
    31 162 0 142,43 129,160 0 32
    1 141,1414
DA  1890 DATA 173 79 112 240 61
    173 255 148,240 11 169 0 141
    ,255 148,141 2346
R3  1900 DATA 173 79 112 76 199 132
    173 26 147 240 16,32 41 147
    169 0,141 1730
DE  1910 DATA 79 112,169 13 141
    151 159 76 199 132 173,72,14
    7,240,16 32,1511
BC  1920 DATA 27,147 169,0,141 7
    3,112 169 13 141 151 159 76
    199 132 76,1791
6S  1930 DATA 141 154 169 0 141
    21 131 173 138 111 240 30 17
    4,21 131,189 1964
27  1940 DATA 151 159,201 33 208
    3 76 199 132 201,52,208,3 7
    6 199,132 2073
4E  1950 DATA 201 64 208 6 32 10
    7 149 76 199 132 169 0,141 1
    30 155,32 1801
3C  1960 DATA 201 121 173,218 12
    4 201 65 208 38 238 130,155
    32,29 128 141 2202
DD  1970 DATA 224,131 169,0,141
    138 111 173 21 128 208 8 173
    ,22 128 208 1983
63  1980 DATA 3,76 199 132 169 2
    55 141 224 131 141 138 111 7
    6,193 132,173,2300
99  1990 DATA 138 111 208 6 32 8
    9 146 76 199 132 173 218 124
    ,201 56 240 2169
B8  2000 DATA 6 201 67,240 2 208
    6 32 93,146 76 199,132 201
    255 208,2078
EE  2010 DATA 3 76 19,138 201,44
    ,240,10 201 47,240,6 201 48
    240 2 1716
D9  2020 DATA 208 3 76 49 138 20
    1 25 240 31,201 26,240 27,20
    1,27 240 1933
EE  2030 DATA 23 201,28 240 19,2
    01,29 240 15 201,30 240 11 2
    01 31,240 1950
F5  2040 DATA 7,201 32 240,3 76
    171 134 76,210 143 201 68 20
    8 3 76 1649
A8  2050 DATA 103 144,201 69 206
    ,3 76 8 145,201,70,208 3 76,
    89 145 1726
56  2060 DATA 201 72 208 17 238,
    130,155 32 29 128 32 113 145
    169 1 141 1011
15  2070 DATA 224 131 76,199 132
    201 71 208 32 238,130 155 3
    2 29 128,173 2159
81  2080 DATA 21 128 141 98 131
    141 96 131,173 22 128 141 98
    ,131 141,97 1815
D8  2090 DATA 131,169 1 141 72,1
    12 76,199 132 201 62 208 6 3
    2 228 145,1915
```

PROGRAM BLOCK3

```
2A  10 REM CBMF4 MACRO ASSEMBLER
    BASIC LOADER BY IAN GOFFE 1
    988 BLOCK3(34560-37759)
33  20 PRINT CCLR; L1=100 FORA=
    34560TO37759STEP16
D7  30 C=0 FORE=ATOA+15 READL C=
    C+L POKEE,L POKES3280 L
80  40 NEXTE PRINT CHOME;"L1
4F  50 READC:IFC<>C1THENPRINT E
    RROR IN LINE L1 END
04  60 L1=L1+10 NEXTA
C9  70 PRINT BLOCK 3 OK  END
E7  100 DATA 76 133,132 201 63 2
    08 20,238 130,155 32 29 128
    173 21 128 1935
6A  110 DATA 141 179 120 173,82
    128 141 180 120 169,1,141 73
    112 76 199 1975
F3  120 DATA 132 201 73 208,3 76
    141 154 201 74 206 6 32 131
    146 76 1862
8A  130 DATA 155 132,201 75,208
    3 76 199 132 201 61,208,25 3
    2 29 128,1913
3C  140 DATA 173,21 128,141 26 1
    28 141 94 131 173 22,128 141
    27,128 141,1743
F8  150 DATA 55 131 169,1,141 28
    128,76 199,132,201,64 208 1
    5 238 130 1856
74  160 DATA 155 32 29,128 32 23
    121 32 43,121 76 199 132,17
    4 218 124 1839
D7  170 DATA 169 66,138 201 255
    240 6 32 173 137 76 199 132
    238,130,155 2367
04  180 DATA 174 130 155 189 151
    159 201,35 208 3,76 26 136
    32 55 128,1862
EE  190 DATA 173 128 128 208 3 7
    6 88 136 201 2 240 63 238,13
    0,155,32,2002
55  200 DATA 29,128 173 22 128 2
    40 15 169 5 160,132 32,52 13
    1 169 1 1586
E3  210 DATA 141 42 123 76 133 1
    32 174 216 124 189 64 140 20
    1 255 208 15 2307
D7  220 DATA 169 225 160 131 32
    52 131 169 1 141 42 123 76 1
    95 132 32,1821
76  230 DATA 173 137 173 21 128
    32 173 137 76,199,132 238,13
    0 155 32 29 1965
C6  240 DATA 128,173,22 128 240
    15 169 5,160 132 32 52 131 1
    69 1 141 1638
5F  250 DATA 42 123 76 199 132 1
    74 218 124 189 125,140 201,2
    55 208,15 169 2396
FD  260 DATA 225 160 131 32 52 1
    31,169 1 141 42,129,76 199 1
    32 32 173 1825
44  270 DATA 137 173 21 128 32 1
    73 137 76 199 132 238 130 15
    5 32 29,128 1920
A0  280 DATA 174 216 124 189 143
    138 201 255 208 15 169 225
    160 131 32 52 2440
D2  290 DATA 131 169 1 141 42 12
    5,76 199 132 32 173,137 173,
    22 128 240,1925
15  300 DATA 15 169 5 160 132 32
    52 131 169 1 141 42 123 76
    199 132 1965
4C  310 DATA 173 21 128 32 173 1
    37 76 199 132 32 23,128 32 1
    03,137 173 1711
C2  320 DATA 147 138 240 106 201
    2 240 51 173 22 128 208 3 7
    6 35 137 1907
59  330 DATA 174 218 124 189 77
    139 201 255 208 15 169 225 1
    60 131 32 52 2369
```

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84  340 DATA 131 169 1 141 42 12
    8,76 199 132 32 173 137 173
    21 128 32 1716
47  350 DATA 173 137 173 22,128
    32 173 137,76 199 132 173 22
    128 208 3,1916
58  360 DATA 76 72,137 174 218 1
    24 169,138 133,201 255,208 1
    5 169 225,160 2500
CE  370 DATA 131 32 52 131 169 1
    141 42 129,76 199 132 32 17
    3 137 173 1750
26  380 DATA 21,128 32 173 137 1
    73 22 128,32 173 137 78 199
    132 173 22 1758
9A  390 DATA 128,240 43 174 218
    124 169,15 133 201 255 208 1
    5 169 225 160,2503
88  400 DATA 131 32 52 131 169 1
    141 42 129 76 199,132 32 17
    3 137 173,1750
DF  410 DATA 21,128 32 173 137 1
    73 22 128 32,173 137,76,199
    132 174 218 1955
D8  420 DATA 124 169 210 136,201
    255 208 15 169 225 160 131
    32 52 131 169 2405
7B  430 DATA 1 141,42 129,76 199
    132 32,173 137 173 21 128,3
    2 173 137 1726
72  440 DATA 76 199 132 174 216
    124 169 199 133 201,255 208
    15 169 225 160,2693
9F  450 DATA 131 32,52 131 169 1
    141 42 129 76 199 132,32 17
    3 137,173 1750
BE  460 DATA 21 128 32 173 137 7
    5 199,132,174 218 124 169,4
    140 201,255 2203
48  470 DATA 208 15 169 225 160
    131 32 52 131 169 1,141 42 1
    29 76 199 1880
92  480 DATA 132 32,173 137,173
    21 128 32 173 137 75 199 132
    160 0 165 1890
EE  490 DATA 151 199,201 33 240
    48 201 13 240 45 201,44 240
    4 200 76 2097
10  500 DATA 111 137 200 185,151
    ,199 201 88 208,6 163 1 141
    147 138,96 2138
E0  510 DATA 201 89 208,6 163,2
    141,147 138 96 169 31 160 13
    2 32 52 1773
40  520 DATA 131 169 1,141 42 12
    9 56 169 0 141,147,138,96 14
    1,74 143 1758
DC  530 DATA 173,42 129 208 93 1
    73 72 112 240,13 174 98 131
    134 63 174 2029
37  540 DATA 99 131,134 64,76 21
    2 137 173 74 143,174 26 128
    134 63 174 1942
E9  550 DATA 27 128,134,64 173,7
    4 143 160,0 145 63 32,215 11
    4 173 77 1722
C9  560 DATA 113,32 182 145 173
    76 113 32 182,145 32,128 128
    238 148 138 2008
BF  570 DATA 173,148 138 201 4,2
    08 27,169,0,141 148,138 169,
    13 32,182 1691
98  580 DATA 145 169,32 32,182 1
    45 32 182 145 32 182 145,32
    182 145 32 1814
23  590 DATA 182 145 96 162,0 18
    3 151 169 201 61,240 8,201 3
    2 240 10 2077
D6  600 DATA 232,76 21,138 32,16
    8,123 76 199 132,232,142,21
    131,76 247,2046
E8  610 DATA 133 173 218 124 201
    47,240 3 238 130 155 32 29
    128 174 218 2243
44  620 DATA 124 189,85,138 32 1
    73 137,173 21 128,32 173 137
    173 22,128,1866
22  630 DATA 32,173,137,76 199 1
    32,255 255 10 255,255 255,25
    5 255,255 255 3054
10  640 DATA 255 255 255 255 74
    255 255,42,255 105,255,255 2
    55 255 255 16 3290
C4  650 DATA 48,80 112 144,176 2
    08 240,138 170 152 168 186 1
    54,8 40 72 2058
73  660 DATA 104 0 32,64 96,100
    76,234 24 56,84,120 184,216
    248 136,1786
2B  670 DATA 200 202,232 0 0 105
    141 255 255,255,201,224 182
    255 73 255 2745
83  680 DATA 153 162 160 255 255
    ,3 255 255 255,255 233 255 2
    55 255 255,255 3538
DE  690 DATA 255 255 255 255 255
    255,255 255,255 255 255 255
    ,255 255 255 255 4080
D1  700 DATA 255 255 255 255 255
    255 255,255 255 255,255 255
    255,255 255 255 4080
B9  710 DATA 255 255 101 37,255
    8 38,197 228 196 138 63,230,
    165 166 164 2958
DE  720 DATA 255 70 5,255 38,255
    102 220,133 134 132 255 255
    ,255 255,255 2883
73  730 DATA 255 255 255,255 255
    255 255 255 255 255,255,255
    ,255 255,255 255 4080
F4  740 DATA 255 255 255 255 255
    255 255,255 255 255,255,255
    ,255 255,255 109 3934
1E  750 DATA 45 255 14 44,205 23
    6,204 206 77 238 173 174 172
    255,78 13 2383
B1  760 DATA 255 46 255 110 237
    141 142 140,255,255,255,255
    255 255,255,255,3366
2A  770 DATA 255 255,255 255 255
    ,255 255,255 255 255,255 255
    255 255 255,255 4080
7A  780 DATA 255 255 255 255,255
    255 255,255 255 255 255 255
    255 125 61 255 3756
42  790 DATA 30 255,221,255 255
    222 93,254 189 255 188 255 9
    4 29 255 82 2812
41  800 DATA 255,126 253 157,255
    255 255 255,255 255 255 255
    255,255 255 255,3051
42  810 DATA 255 255 255 255 255
    255 255 255 255 255,255 255
    255 255 255 255 4080
BC  820 DATA 25 255,255 255 255
    255,255 255 255 255 121,57,2
    59 255,255 217 3400
7E  830 DATA 255 255 255,88 255
    185 150 255,255 255 25 255 2
    55 255 255 249 3543
F4  840 DATA 153 255 255 255 255
    255 255,255 255 255,255 255
    255 255 255 255 3970
3F  850 DATA 255,255 255,255 255
    255,255 255 255 255 255 255
    ,255,25,255 255 3850
01  860 DATA 255 255 255 255 255
    255 255 117 53 255 22,255 2
    13,255 255 214 3424
67  870 DATA 85 246 181 255 180
    255 86,21,255 54 255 118 245
    149 255 148,2788
9C  880 DATA 255 255 255 255 255
    255 255 255 255 255 255,255
    255 255 255 255 4080
1B  890 DATA 255 255 255 255,255
    255 255 255 255 255 255 25 255
    255 255 255 255 3850
AB  900 DATA 255 255 255 255 255
    ,255 255 255 255 255 255 255
    255 255 255 255 4080
41  910 DATA 182 255 255,255 255
    ,255 255 255 255,255,255 150
    255 255 255 255 3802
34  920 DATA 255 255 255,255 255
    ,255 255 255 255,255,255 255
    255 255 255 255 4080
28  930 DATA 255 255 255 255,255
    255 25 255 255 255 255,255
    255,255 255 255 3850
C7  940 DATA 97 33 255 255,255 1
    53,255 255,255 65 255,161,25
    5 255 255 255 3394
78  950 DATA 1 255 255 255,255 2
    25,123 255,255 255,255,255,2
    55 255 255 255 3670
EC  960 DATA 255 255 255,255 255
    255 255 255 255,255,255 255
    ,255 255,255 255 4080
F3  970 DATA 255 255 255,25 255
    255,255 255 255 255,255 255
    255 113 49 255 3602
9B  980 DATA 255 255,205 255 255
    255,81,255 177 255 255 255
    255 17 255 255 3644
48  990 DATA 255 255 241 145,255
    255 255 255 255,255,255 255
    255,255 255 255 3356
04  1000 DATA 255 255 255,255 25
    5 255 255 255 255 255 255 25
    5,255 255,255 255,4080
14  1010 DATA 25 255 255 255,255
    ,255,255,255 255 255,173 26
    147 201,1 240 3106
04  1020 DATA 37 173 72 147 208
    5 160 0 177 253,96 138 72 17
    3 170 145 2026
2A  1030 DATA 240 5 162 32 32 19
    8,255 32 207,255,141,74 143
    236 38 208,2281
66  1040 DATA 104 170 173,74 143
    ,96 138,72 173 170 145 240 5
    162 10 32 1307
4D  1050 DATA 198 255 32,207,255
    238,38,208 141,74 143,104 1
    70 173 74 143 2454
1D  1060 DATA 96 173 255,148 240
    ,4,32 72 150 96,32,25 141 17
    3 26,147 1810
A7  1070 DATA 201 1 240 1 96 32
    0 149 96 173 26 147 201 1 24
    0 15 1615
9D  1080 DATA 173 72 147,208 10
    165 253 141 153 132 165,254,
    141 154 132 160 2460
D1  1090 DATA 0 173 171 141,240
    10 169 13 32 182 145 169,32
    32 182 145 1839
A6  1100 DATA 32 186,140 141 169
    141 32 82 113,32 186 140,14
    1 170 141 32 1670
AC  1110 DATA 82 113,173 169 141
    ,208 11 173 170 141 208 6 16
    9,1 141,75 1305
67  1120 DATA 112 96 32 186 140
    141 248 112,32 82,113 32,186
    140 141,243,2042
C6  1130 DATA 112 173,171 141,24
    0,14,174 248 112 173,243 112
    32 205,189 169,2514
E0  1140 DATA 32 32,182 145 32 8
    2,113 162,0 32 186,140 32,17
    2,141,32 1515
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63 1150 DATA 82 113 173 153 132
  205,169,141 208,239 173 154
  132,205,170 141,2530
CD 1160 DATA 208,231 202 169 13
  157 151 153 36,0 0 0,141 74
  143,201 1549
1A 1170 DATA 204 176 37 201 170
  240 52,201 171,240 53,201 1
  72 240 54 201 2613
54 1180 DATA 173,240 55 201 174
  240 56 201 177,240 57,201 1
  76 240 58 201 2602
63 1190 DATA 175 240 59 173 74
  143 46 59 157 151 159 141 74
  143 232 173 2205
4E 1200 DATA 171 141 240 6,173,
  74 143 32 182,145 86 169 43
  76,216 141 3048
C9 1210 DATA 169 45,76 216 141
  169 42 76,216 141 169 47 76,
  216 141 169,2109
72 1220 DATA 94 76 216,141 169
  62 76 216 141 169,61,76,216,
  141 169 60 2083
30 1230 DATA 76 216,141,56 233
  128,141 68,143 169,0,141 73
  143 169 158 2059
14 1240 DATA 133 63,169 160 133
  64 160 0,173 68,143 201 255
  240 35 160 2157
E3 1250 DATA 0 177 63 48 3 230
  63 208 2 230 64 76,47,142 17
  3 73 1605
8F 1260 DATA 143 205,68 143 240
  6 238 73 143 76 53 142 230
  63 208 2 2033
C5 1270 DATA 230 64 160 0 177 6
  3 141 74 143 48 27 230 63 20
  8 2 230 1860
31 1280 DATA 64 173 171 141 240
  6 173 74 143 32 182 145 173
  74 143 157 2091
01 1290 DATA 151 159 232 76 82
  142 41 127 141 74 143 173 17
  1 141 240 6 2095
03 1300 DATA 173 74 143,32 182
  145 173 74 143 157 151 159 2
  32 96 13 63 2016
F7 1310 DATA 82,82 79 82 35,49,
  57 58,77 65 67,82,79,32,68 7
  3 1067
04 1320 DATA 82 63 67,84 79 82
  69 32 70 85,76 76 32,0 13 69
  ,1005
9A 1330 DATA 82,82 79 82,35 50
  48 58,77 65 67 82 79 32 76 7
  3 1067
67 1340 DATA 66,82 65 82 69 32
  70 85 76,76 32 0 13 69,82 82
  1001
A0 1350 DATA 79 82 35 49 51 50
  68 63 66,73 67 69,32 79 70 7
  0 1037
5E 1360 DATA 45,76 73,70 69 32
  0 13 69 32,82 79 82 35 49 52
  816
12 1370 DATA 58,78 69,83 84,69,
  68 32 77,65,67 82,79 32 67,6
  5 1075
65 1380 DATA 76 76 32,0,13 69,6
  2 82 79 82,35 49 53,58 79 69
  833
D9 1390 DATA 83 84 69,68 32 73
  78 67 75 85 68 69,68,32 70 7
  3 1085
DD 1400 DATA 76,69 32 0 13 69 8
  2,82 79 82,35 49 54 58 76 69
  927
01 1410 DATA 83 84,69,68 32,73
  78 67,76 85 66,63,47 77 65 6
  7 1108
EE 1420 DATA 82,79 32,0 0 0 0 0
  ,240 0 0,0,13 65,82 82,67,9
9E 1430 DATA 75 82 35,49,49 58
  70 73 76,59 78 65 77 69 32,7
  6 1039
D8 1440 DATA 79 84 32 70 78,85
  76 68 47,73 79,32 69 82,82 7
  9 1118
94 1450 DATA 82 32,0,13 77,69,6
  7 82,79 32 65,63,83 65 77,66
  ,972
8C 1460 DATA 76 63,82 32 68,79,
  83 32 83,85,80 80 78 82,84 3
  2 1126
DF 1470 DATA 32 32 32 32 32 32
  32 32 32 32 32,32,84 85 80,6
  9 705
AE 1480 DATA 32 68,79 83 32 67,
  79 77,77 65,78,58,46 48 13,8
  8 998
B6 1490 DATA 45,63 68,73 84,32,
  82 63 84,65,82 76 45,82 65,6
  5 1132
DF 1500 DATA 68 32 63,82 82,79,
  82 32,67 72,65,76 76 63,76,1
  3 1044
71 1510 DATA 13 0,238 130 155,3
  2 29,128 56 173,26 128 237,2
  1 128 173,1667
AC 1520 DATA 27,128,237,22,128
  48 36 56 173,26,128 237,21,1
  28 141 201,1737
A2 1530 DATA 115 173,27,128 237
  ,22,128 208 85 173,201 115 2
  01 127 176,88 2214
D8 1540 DATA 73 255,141 201 115
  238 201,115 76 56,144,56 17
  3,21 128 237,2030
1C 1550 DATA 26,128 141,201 115
  ,201 130,176,83 56 173 21 12
  8 237 26,128,1050
16 1560 DATA 173,22 128 237 27,
  128 208 48 56 173 21 128 237
  ,26,128 141 1801
70 1570 DATA 201 115 173 22,128
  ,237,27 128 173,201,115,56,2
  33,2 141 201,2153
4E 1580 DATA 115 208 3 206 202
  115,174 216 124,189 86 138 3
  2 173 127 173 2293
BD 1590 DATA 201 115 32 173 137
  76 133,132 165,57,160 132 3
  2 52 131 169 1367
6D 1600 DATA 1 141 42 129 76 15
  5,132 169 0 141,59 143 238 1
  30 155 174,1535
9F 1610 DATA 130,155 189,151 15
  5 201 34 240 52,201 13,240 6
  0,173 63 143,2258
84 1620 DATA 208,109,32 89,128
  173 19 131 201,3,208,3,76 14
  3,144 32 1645
AC 1630 DATA 129,120 76 175,144
  ,173 22 128 240 15 169 1 141
  ,42 121 169 1001
12 1640 DATA 5,160,132 32 52 13
  1 76,133,144 173,21,128 32,1
  73 137,173,1762
6C 1650 DATA 20,128,24 108,130
  155 141 130,155,170 189 151,
  153,201 44 240 2146
5C 1660 DATA 171 173,19 131 201
  ,3 208 3 76 88,116 201 2,200
  3 76 1688
70 1670 DATA 226 117,76 188,132
  ,173 63 143 73,255,141,63 14
  3,208 13 230 2275
25 1680 DATA 130 155 174,130,15
  5 189 151 159,201 44 208,213
  ,76 109 144,174 2411
33 1690 DATA 130 155,1 3 19 31
  201,3 208 9 189 151,159 32
  173 137 76 1946
7E 1700 DATA 108 144 32 123 168
  76 108 144 238 130 155 32 2
  9 120 173,19 1773
F5 1710 DATA 131,201 3 208,3 76
  ,33 145,32 123 128 32 123 12
  8 79 45 1455
68 1720 DATA 145 173 21 128 32
  173,137 173 22,128 32,173,13
  7 173,20 128 1755
12 1730 DATA 24,100,130,155 141
  130 155 170,189,151,159 201
  44 240 201,76 2275
21 1740 DATA 133,144 238,130 15
  5 230 130,155 174 130 155,23
  6 130,155,189 151 2705
37 1750 DATA 159 201 34 240 25
  201,13 240,21 168 173 19 131
  ,201 3 240 2069
1F 1760 DATA 6,32 129 120 76 72
  145 152 32 173 137,76 72 14
  5 76 153 1644
32 1770 DATA 144 32 171 145 173
  21,120 141,170 145 169 0 32
  189 255 169,2084
4A 1780 DATA 4,174 170 145 160,
  255 32 186 255 32,152 255 16
  2 4 32 201 2259
93 1790 DATA 255 160 13 32 210
  255 32 174 255 165 144 41 12
  8 240 10 165 2282
9A 1800 DATA 204 141 42 129 160
  142 32 52 131 96 0 169 13 3
  2 182 145 1670
30 1810 DATA 169 4 32 135 255 5
  6 72,201 13 208,5,165 0 141
  226,145 1531
50 1820 DATA 173 15 131 240,10
  173 170 145 208,5 104,236,22
  6 145 96,142,2225
FF 1830 DATA 227 145 162 4 32 2
  01 255 104 32,210 255 236 22
  6,145 174 227 2637
F4 1840 DATA 145 96 0 0,169 0 1
  41 125,155 169 230 130,155 2
  38 130,155 2045
34 1850 DATA 174,130,155,189 15
  1 159 201 34 240,15,201 13 2
  40 11 238 125,2276
1F 1860 DATA 155 153,131 155,20
  0 232 76 243 145,32 231,255
  173 116 155 201 2653
69 1870 DATA 1,208 13,169 116 1
  60 148 32 52 131 32,237 148
  32 147 148 1776
6E 1880 DATA 173,116 155 170,16
  0,0 32 186 255 173,125 155 1
  62 131,160,155 2308
6F 1890 DATA 32 169,255 169 0 1
  62 1 160 8,32 213 255 144,30
  169 46 1064
70 1900 DATA 160 148 32 52 131
  32 237,148 32 147,148,201 63
  208 209,169 2117
41 1910 DATA 76 160 143 32 52 1
  31 169 1,141 42 129 86 32 12
  2 145,32 1603
46 1920 DATA 148 123 56,173 216
  ,124 201 67 208 12,173 136 1
  11 73,255 141,2261
78 1930 DATA 138,111,141 224 13
  1 96 201 66 208 9 169,255 14
  1,138,111 141,2273
6F 1940 DATA 224 131 56,173 72
  147,240 33 169 4,160 143,32
  52 131,169 1956
98 1950 DATA 1 141 42 129 86 32
  27 147 32 246 151 32,231,25
  5 238 130 1530
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32  1950 DATA 155 238,130 155,17
    4 130 155 160 0 140 125 155
    188 151 159 201 2417
41  1970 DATA 34 240 15,201 32,2
    40 15 201,13 240,11 153 131
    155,232 200 2117
38  1980 DATA 238 125 155,76 172
    146,173,125 155 162,131 160
    ,155 32 185 255 2498
FE  1990 DATA 169 32 174 116 155
    160 0,32 186 255 32,198 255
    162 32 142,2084
47  2000 DATA 72 147 32 198 255,
    169 1 141 153,132 169,8 141
    154,132 173,2077
E3  2010 DATA 170 145 240,3 32,1
    22 145,32 186 140 32,186 140
    ,166,144 240,2122
4F  2020 DATA 24,163 45 160 148,
    32 52 131 32 237,148 32,147,
    148 201 69,1763
F2  2030 DATA 208 190 32,155,146
    86 76,198 146,96 0 169,32,3
    2 155 255 2016
56  2040 DATA 169,0 141,72,147 3
    2 151,155 96,169,10 32 155 2
    55 169 0 1733
30  2050 DATA 141 26 147,169,255
    32,56 149,173 74,112 141,71
    143,173 75 1537
EE  2060 DATA 112 141 72,143 32,
    151 155,96 0 162,2 169 151 1
    55 201 34 1800
1F  2070 DATA 208 1 232,160,0 14
    0,125 155 169 151 153,201,34
    240 15 201 2211
34  2080 DATA 13 240 11 153 131,
    155 238 125 155 232,200 76,8
    9,147 96,173 2233
45  2090 DATA 72 147 240 13 169
    36 160 143,32 52 131 169 1,1
    41 42 125 1677
```

PROGRAM BLOCK4

```
E2  10 REM COM64 MACRO ASSEMBLER
     BASIC LOADER BY IAN GOFFE 1
    989 BLOCK4(37760-40850)
6C  20 PRINT [CLR]" L1=100 FORA=
    37760TO40850STEP16
D7  30 C=0 FORE=ATOA+15 READL C=
    C+L POKEE,L POKE53280,L
60  40 NEXTE PRINT"[HOME]'L1
4F  50 READC1 IFC<>C1THENPRINT"E
    RROR IN LINE L1 END
04  60 L1=L1+10 NEXTA
C6  70 PRINT"BLOCK 4 OK  " END
EF  100 DATA 96,32,246,151 32,23
    1 255 174,21 131,232 160,0 1
    40,125,155 2181
50  110 DATA 189 151 159,201,32,
    240 17,201 33 201 13,240,11,
    153 131,155,2127
E6  120 DATA 232 200,238 125,159
     76 144,147-172 125 155 162,
    0,169 131,155 2406
F3  130 DATA 32 174 140 232 136
    208,246 169,13 32 174 148,17
    3 74 112 32,2103
45  140 DATA 174 148,173,75 112
    32 174 148,169 255 32 174,14
    8 56 173 76,2119
DA  150 DATA 112,233 1 141 76 11
    2 176 3 206 77 112,173 125 1
    55 162 131 1995
86  160 DATA 160 155 32 169 255
    169 10 174,116 155 160 0,32
    186 255 32 2000
00  170 DATA 182 255,162,10 169
    1 141 26 147 32 186 255 169
    1 141 153,2062
08  180 DATA 132 169 8,141,154,1
    32 173 170 145 240,3 32 122
    145 32 186 1984
C7  190 DATA 140 32 186 140 165
    144 240 20 169 45,160 146 32
    52 131 32 1636
9E  200 DATA 237 146 32,147 148
    201 63 240,114 76,219,147 36
    ,13 70 73 2024
85  210 DATA 76 69 70 65 77,65 3
    2 73 83,32 78 79 84,32 80 02
    1089
84  220 DATA 65,83 65 76,84,32 7
    5 78 32,67 85 82,82 69 78 84
    1151
1D  230 DATA 32 68 73 83,75 32,8
    0,76 65 65 83 65 32,73 76 83
    1071
0B  240 DATA 69 82,84 32 60 73 8
    3 75,32,67 73 78,84,65 73 78
    1122
E6  250 DATA 73,76,71 56,13 0 13
    73 78,83 68 82,84,32 70 73
    550
FC  260 DATA 76 69 32 38,32 80 6
    2 69 03 83 32,85 32,75 65,85
    ,1006
88  270 DATA 56 13,0 32 228 255
    240 251 165 197 96 169 76 16
    0 143 32 2115
4H  280 DATA 52 131 169 1 141,42
    ,128 32 41 147 32,27 147 96
    141 74 1402
7C  290 DATA 143 140 75 143 173
    76 112 133 63 173,77 112 133
    64,160,0,1777
6E  300 DATA 173 74 143 145 63 1
    72 75 143 238 76 112 206 3 2
    30 77 112 2052
4D  310 DATA 173 76 112 205 73 1
    31 206 20 173 77 112 205 74
    131 208,12 1990
9E  320 DATA 169 142,160,142 32
    52 131 165,1 141 42 125,96 1
    62,0 185 1757
DD  330 DATA 131 155 236 125 155
    ,240 6 32,210 255 232,208 24
    2 96 0 0 2323
80  340 DATA 162 0,142 254 148 1
    83,151,159 201 34 240 15 201
    13 240,17,2166
CE  350 DATA 201 33 240 24 32 56
    149 232 76 5 149 238 254 14
    8 75,20,1833
EB  360 DATA 149 169 13 32 56 14
    9,169 33 141 151 159 96 32 5
    8,149 232 1786
OO  370 DATA 173 254,148 209 208
    ,75 33 149,172,74 112 132 63
    ,172 75 112 2161
11  380 DATA 132,64 160 0 145,63
    238 74,112 208 3,238 75,112
    ,173 74 1671
DF  390 DATA 112 205,59 131 208
    20 173 75 112,205,70 131,208
    12 169 174 2074
F3  400 DATA 150,142,32,52 131 1
    69 1,141 42 129 96 173,255 1
    46 240,13 1924
F5  410 DATA 169 231,160 142,32
    52 131 169 1,141 42 129 96 1
    74 21 131,1821
1D  420 DATA 232,160 0 140 125 1
    55 169-151 159 201 32 240 19
    201 13 240,2257
9A  430 DATA 15 201 33 240 11 15
    3 131,155 232,200-238 125,15
    5 76,134,149 2246
FI  440 DATA 202 142 246 150 162
    0,169 151 159 157,142 131 2
    01 13 240,4 2263
CO  450 DATA 232 76 166 149 169,
    2 141 255 148 238 245 112,17
    3 245,112 201 2664
7F  460 DATA 90 208 6,169 65 141
    ,245 112 236 244 112 174 71
    131 172 72 2252
D5  470 DATA 131 134 63 132 64 1
    62 0 160 0 32,15,153 201 255
    240 64 1630
O2  480 DATA 201 13 240 50 221 1
    31 155 208 15 230,63 206 2 2
    30 64,236 2267
9C  490 DATA 125 155,240 4 232 7
    6 215 149 32 13 153 201 13 2
    40,8,230 2053
FA  500 DATA 63 206 2 230 64 76
    248,149,24 165 63 105,3 133
    63 144 1740
06  510 DATA 2 230 64,76 213 149
    236 125 155 208 221 230 63
    206 2 230 2412
25  520 DATA 64 32 15 153 141 70
    150 230 63 206 2 230 64 32,
    15,153 1630
61  530 DATA 141 71 150 98 169 1
    ,141 42,128 169 64 160 132 3
    2 52 131 1700
CC  540 DATA 169,33 141 151,159
    96,0 240 162 0 173 70 150 13
    3 63 173 1513
11  550 DATA 71 150 133 64 160 0
    32 15 153 201 255 240,30 20
    1 47 206 1964
92  560 DATA 3 76 130 150 157,15
    1 159,230 70 150,230,63 208
    5,238 71 2058
5C  570 DATA 150 230 64 201,13 2
    40 10 232 76 84,150 169 1 14
    1 73 112 1952
1D  580 DATA 86 36 230 63 238 70
    150,208,5 230 64 238 71 150
    ,32 15 1560
13  590 DATA 153 230 63 238 70 1
    50 208 5 230 64 238 71 150 5
    6 233 96 2207
7C  600 DATA 141,245 150 172,246
    150 169 0 141,244 150,173 2
    45 150 240 94 2660
8E  610 DATA 185 148 131 201 44,
    240,23 201,13 240,4 200 76,1
    76 150 169 2136
4F  620 DATA 1 141 42 129,169 11
    7 160 132,32 52,131 76,123,1
    50 230 244,1537
E3  630 DATA 150 173 244 160 205
    ,245 150 206 226 76,221 150
    200 200,185,142 2325
5D  640 DATA 131 201,13 240,12 2
    01 44 240,8,157,151 159 200
    232 76,222 2207
4F  650 DATA 150,76 84 150 0 0 0
    162 2 160 6 139,63 132 64,1
    60 1345
10  660 DATA 0 177 63 208 46,200
    177 63 208 41 200 177 63,20
    6 38 24 1691
58  670 DATA 155 63 105 3 133 63
    144 2 230 64,169,8,133 44,1
    69 1 1496
17  680 DATA 133 43 169 255 141
    2,0 32,51 185,165,83,133 45
    165,64 1634
77  690 DATA 133 46,96 230 63 20
    8 2 230 64 76 255 150 173,11
    6 156 170 2167
5E  700 DATA 160 0,32 185,255 32
    ,121 155,173 125 155 162 131
    160 155,32 2034
```

```
23  710 DATA 169,255,166,45,233,
    2,170,165,46,233,0,168,169,0
    ,32,213,2005
5E  720 DATA 255,144,15,169,76,1
    60,143,32,52,131,169,1,141,4
    2,129,76,1735
5E  730 DATA 80,110,134,45,132,4
    6,32,51,165,165,1,141,61,152
    ,169,0,1486
A5  740 DATA 141,62,152,169,1,14
    1,63,152,32,114,152,76,80,11
    0,32,247,1724
43  750 DATA 150,76,80,110,169,2
    ,141,130,155,32,25,128,173,2
    ,1,128,141,1865
3A  760 DATA 61,152,173,22,128,1
    41,62,152,173,20,128,141,130
    ,155,238,130,2006
22  770 DATA 155,238,130,155,230
    ,130,155,32,29,128,173,21,12
    8,141,63,152,2068
D3  780 DATA 169,203,160,151,141
    ,2,3,140,3,3,96,173,0,2,240
    ,63,1549
64  790 DATA 174,61,152,173,62,1
    52,32,26,152,134,198,169,0,2
    ,157,119,1785
F6  800 DATA 2,202,16,247,24,173
    ,61,152,108,63,152,141,61,15
    2,144,3,1702
30  810 DATA 238,62,152,76,131,1
    64,169,3,141,21,208,169,226
    ,141,0,208,2103
3F  820 DATA 169,200,141,1,208,2
    38,40,200,141,2,208,141,3,20
    8,96,169,2173
1C  830 DATA 131,141,2,3,169,164
    ,141,3,3,108,2,3,134,89,133
    ,96,1334
8A  840 DATA 162,144,56,32,73,18
    8,32,223,189,32,135,180,32,1
    66,102,162,1966
65  850 DATA 0,189,0,1,157,0,2,2
    40,3,232,208,245,96,16,38,5
    ,1433
56  860 DATA 169,2,141,130,155,3
    2,25,128,173,21,128,141,61,1
    52,173,22,1857
A8  870 DATA 128,141,62,152,173
    ,20,128,141,130,155,238,130,1
    55,238,130,155,2276
BE  880 DATA 238,130,155,32,29,1
    28,173,21,128,141,63,152,32
    ,114,152,76,1764
DA  890 DATA 80,110,165,43,133,6
    ,3,165,44,133,64,160,0,177,63
    ,72,200,1872
7E  900 DATA 177,63,170,173,61,1
    52,200,145,63,24,152,200
    ,145,63,24,2023
A7  910 DATA 173,61,152,105,63,1
    52,141,61,152,144,3,238,62,1
    52,134,64,1861
E7  920 DATA 104,133,63,200,213
    ,138,208,210,96,165,115,160,1
    43,32,52,131,2175
52  930 DATA 169,68,32,210,255,1
    69,79,32,210,255,169,83,32,2
    10,255,32,2260
A5  940 DATA 103,114,173,151,169
    ,201,68,208,3,76,80,110,138,
    162,151,160,2077
18  950 DATA 169,32,189,255,169,
    15,174,116,155,160,15,32,196
    ,255,32,162,2136
3A  960 DATA 255,32,251,152,160,
    15,32,195,255,32,231,255,76
    ,176,152,189,2447
33  970 DATA 15,174,116,155,168,
    32,186,255,32,162,255,162,15
    ,32,196,255,2242
BF  980 DATA 32,207,255,32,210,2
    55,201,13,208,246,165,15,32,
    195,255,96,2421
9B  990 DATA 76,176,152,120,169
    ,44,133,1,177,63,141,74,143,1
    69,55,133,1826
21  1000 DATA 1,173,74,143,88,96
    ,169,162,160,153,32,52,131,1
    74,71,131,1810
57  1010 DATA 172,72,131,134,63,
    132,64,160,0,32,19,153,201,1
    3,240,15,1602
B3  1020 DATA 201,255,240,38,32
    ,162,145,230,63,208,2,230,64
    ,76,55,153,2174
1A  1030 DATA 32,162,145,32,228
    ,255,240,251,201,76,240,52,24
    ,165,63,105,2231
65  1040 DATA 3,133,63,144,2,230
    ,64,76,55,153,56,173,89,131
    ,237,71,1660
EA  1050 DATA 143,141,160,153,17
    3,70,131,237,72,143,141,161
    ,153,174,160,153,2365
D4  1060 DATA 173,161,153,32,205
    ,189,169,147,160,153,32,52,1
    31,76,80,110,2023
4A  1070 DATA 76,231,153,32,86,8
    5,84,65,83,32,70,82,65,69,46
    ,0,1251
8A  1080 DATA 0,0,13,77,65,87,82
    ,73,32,76,73,66,82,65,62,89
    ,948
B1  1090 DATA 13,13,80,82,69,93
    ,83,32,38,76,38,32,84,78,32,7
    6,812
43  1100 DATA 73,83,84,32,69,88
    ,80,65,70,83,73,78,44,32,7
    9,1170
37  1110 DATA 82,32,65,78,83,32
    ,75,69,85,32,84,78,32,67,79,7
    8,1082
D3  1120 DATA 84,73,78,85,69,13
    ,0,160,0,230,63,208,2,230,64
    ,32,1351
63  1130 DATA 15,153,141,160,153
    ,200,32,15,153,133,64,173,16
    ,0,153,133,63,1908
CE  1140 DATA 160,0,32,15,153,20
    1,255,208,3,76,106,153,32,18
    2,145,230,1955
25  1150 DATA 63,208,2,230,64,76
    ,0,154,32,148,123,169,0,141
    ,171,141,1722
C2  1160 DATA 162,0,189,153,159
    ,157,142,131,201,13,240,13,23
    2,76,34,154,2056
C8  1170 DATA 185,187,201,63,208
    ,3,76,80,110,169,0,141,70,14
    3,32,1,1653
4C  1180 DATA 141,173,78,112,240
    ,3,76,80,110,174,70,143,180
    ,0,185,142,1888
17  1190 DATA 131,201,13,240,23
    ,169,151,159,13,240,46,21
    7,142,131,208,2305
F9  1200 DATA 5,232,200,76,78,15
    4,234,70,143,76,73,154,174,2
    46,112,173,2206
F8  1210 DATA 248,112,32,205,189
    ,169,32,32,182,145,162,0,189
    ,151,159,32,2040
A3  1220 DATA 182,145,201,13,240
    ,4,232,76,124,154,76,46,154
    ,169,0,141,1959
30  1230 DATA 171,141,32,171,145
    ,189,20,160,155,32,52,131,17
    4,84,131,172,1950
16  1240 DATA 95,131,32,228,154
    ,174,26,128,172,27,128,32,228
    ,154,173,72,1954
50  1250 DATA 112,240,25,169,71
    ,160,155,32,52,131,174,56,31
    ,172,87,131,1948
11  1260 DATA 32,228,154,174,98
    ,131,172,88,131,32,228,154,1
    3,74,112,240,2231
42  1270 DATA 16,169,83,160,155
    ,32,52,131,174,179,120,1,2,18
    0,120,32,228,2013
46  1280 DATA 154,76,80,110,152
    ,142,74,143,32,215,114,169,76
    ,32,210,255,1834
42  1290 DATA 173,77,113,32,210
    ,255,173,78,113,32,210,255,17
    3,79,143,32,2143
24  1300 DATA 215,114,173,7[illegible],13
    ,32,210,255,173,78,113,32,21
    0,255,169,32,2251
ED  1310 DATA 32,210,255,96,13
    ,2,42,32,85,83,83,69,77,66,8
    ,89,1330
74  1320 DATA 32,67,73,77,85,70
    ,68,84,69,32,45,32,78,78,32,6
    9,1000
A5  1330 DATA 82,82,79,82,87,32
    ,42,42,13,13,79,66,74,69,8,8
    4,883
F5  1340 DATA 32,8[illegible],78,68,69,[illegible]
    0,13,13,78,66,71,69,67,81,32
    ,870
44  1350 DATA 87,79,69,69,3[illegible],87
    ,84,79,82,69,88,58,0,13,78,66
    ,886
E4  1360 DATA 74,69,67,84,32,87
    ,88,69,67,85,84,69,83,32,0,8
    2,1124
AD  1370 DATA 79,77,58,0,8,0,16[illegible]
    ,255,255,32,73,147,96,0,32,2
    15,1431
DC  1380 DATA 124,96,0,73,65,[illegible]
    32,74,79,72,78,32,71,78,70,7
    0,1083
7C  1390 DATA 69,32,49,57,56,5
    33,169,0,141,21,208,96,169,1
    ,162,1320
1D  1400 DATA 28,160,156,32,189
    ,255,169,32,174,116,155,160,0
    ,32,186,255,2089
32  1410 DATA 32,192,255,162,32
    ,32,198,255,32,207,255,32,207
    ,255,32,207,2385
B3  1420 DATA 255,32,207,255,32
    ,207,255,170,32,207,255,32,20
    ,
44  1430 DATA 32,210,255,32,207
    ,255,168,165,144,208,54,152,3
    ,2,210,255,32,2411
E7  1440 DATA 207,255,201,34,240
    ,5,32,210,255,208,244,32,210
    ,255,32,207,2627
D1  1450 DATA 255,32,210,255,32
    ,207,255,240,5,32,210,255,208
    ,246,169,13,2824
FE  1460 DATA 32,210,255,169,145
    ,201,127,240,8,201,238,240,2
    46,165,144,240,2658
C5  1470 DATA 173,169,32,32,195
    ,255,32,231,255,76,80,110,36
    ,32,121,155,1884
DD  1480 DATA 173,125,155,162,13
    ,1,160,155,32,189,255,169,3,1
    74,116,155,160,2314
1C  1490 DATA 1,32,188,255,32,19
    ,2,255,162,3,32,201,255,169,0
    ,32,210,2017
B5  1500 DATA 255,32,210,255,32
    ,243,156,173,117,155,133,63,1
    73,118,155,133,2403
BF  1510 DATA 84,160,0,120,169,4
    ,4,133,1,177,63,162,55,134,1
    ,32,210,1525
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EA  1520 DATA 255 69 230 63 208
    2 230 64 165,63,205 93 158 2
    08 226 165 2423
A2  1530 DATA 64 205 94 198 208
    218,169 3 32 139 255 32 204
    255 76,60 2245
6C  1540 DATA 110 238,130 155 23
    8 130 155 174 130 155,160,0
    140 125 155 169 2384
E3  1550 DATA 151 155 201,34 240
    13 201 32 240 15 201 13 240
    11 153 131 2041
5W  1560 DATA 155 232 200 238 12
    5 155,78 143 156 173,116 155
    174 116 155 160 2529
AD  1570 DATA 0,32 186,255,173 1
    25 155 162 131 160 155 32 18
    8 255 169 0 2175
4E  1580 DATA 174 113 155 172 12
    0 155 32 213 255,144 30 165
    45 160 148 32 2123
B6  1590 DATA 52 131 32 237 148
    32 147 148,201 63 208 205 16
    3 76 160 143 2152
21  1600 DATA 32 52 131 169 1 14
    1 42 123 96 142 119 155 140
    120 155 32 1656
E8  1610 DATA 215,124 96 160 0 1
    74 117 155 173 118,155 134 6
    3 133 64 163 2054
1E  1620 DATA 0 32 52 157 201 25
    5 240 14 201 1 240 21 201 2
    240 17 1874
DC  1630 DATA 32 45 157 76 255,1
    56 165 63 141 93 150 169 64
    141 94 158 1983
BA  1640 DATA 96 32 45,157 32 45
    157 32 45,157,76,255 156 23
    0 63 208,1786
F8  1650 DATA 2 230 64 96 120 16
    2 44 134 1 160 0 177 63 162
    55 134 1604
4C  1660 DATA 1,88,96,169 84 160
    157 32 52 131 169 223 160 1
    57 32 52,1763
B2  1670 DATA 131 76 80 110 17,5
    5 45 65 83 83 69 77 66 76 69
    13 1121
62  1680 DATA 66 45 66 65 83 3
    67 13 68 45 68 73 82 69 67 8
    4 1034
15  1690 DATA 79 82,89 13 68 45
    69 86 65 76 85,69,84,69,32 6
    5 1077
9A  1700 DATA 88,80 82 69 83 83
    73 79 78 13 70 45 70 73 78 6
    8 1132
FA  1710 DATA 32 83 84 82 73 78
    71 13 71 45 71 73 84 79 32 6
    5 1042
9E  1720 DATA 68 68,82 69 83 83
    13 72 45 72 83 78 80 13 73 4
    5 1011
B7  1730 DATA 83 65 86,69 32 79
    66 74 69 67 84 32 40 79 02 7
    1 1078
C5  1740 DATA 41 13 74 45 83 85
    86 83 32 73,66 71 69 67 81 3
    2 979
3A  1750 DATA 40 76 79 65 68 41
    13 76 45 76 73,83 84 13 0 77
    903
20  1760 DATA 45 77 65 67 82 79
    32 76 73 66 82 65,82 88 13 7
    8 1071
3C  1770 DATA 45 65 80,80 69 78
    68 13 79 45 79 76 68 13 81 4
    5,984
AF  1780 DATA 83 65 86 69 32 84
    88 77 66 79 76 32 84 6 66 2
    6 1128
E2  1790 DATA 65 13 82 45 82 6
    78 85 77 66 69 82 13 83 44
    6 1034
55  1800 DATA 73 83 84 32 70 82
    79 77 32 98 73 83 79,13 85 4
    5 1054
CF  1810 DATA 65 85 84 79 13 68
    45 83 65 86 69 32 77 47 67 1
    3 938
35  1820 DATA 89 45 83 85,77 68
    79 76 32 84 65 88 76 69 13 4
    0,1038
E3  1830 DATA 45 66 79 83 32 83
    85 80 80,79 82 84 0 0 0 173,
    1053
9F  1840 DATA 116 155 170 160 1
    32,185,255 32 121 155 173 12
    5 155 162 131 2125
98  1850 DATA 160 155 32 189 255
    173 84 131 133 63 173 85 13
    1 133 64 174,2155
59  1860 DATA 26,128,172 27 128
    163 63 32 216 255 76 60 110
    173,116 155 1926
39  1870 DATA 170,160 1 32 186 2
    55 32 121 155 173 125 155 16
    2 131 160 155 2173
D9  1880 DATA 32 189 255 173 96
    131 133 63,173 97 131 133 64
    174 98 131 2073
53  1890 DATA 172 55 131 165 63
    32 216 255 76 80 110 169 45
    160 159 32 1666
A7  1900 DATA 52 131 32 103 114
    165 0 141 130 155 32 29 128
    173 21 128 1938
5E  1910 DATA 141 83,155 173 22
    128 141 84 155 169 59 160 15
    3 32 52 131 1852
AF  1920 DATA 32 103 114 169 0 1
    41 130 155 32 25 126 169 71
    160 159 32 1824
17  1930 DATA 52 131 32 109 114
    162 0 189 151 159 157 131 15
    9 201,13,240 1990
ED  1940 DATA 3 232 208 243 138
    162 131 160 155 32 189 255 1
    73,116 155,170 2522
3D  1950 DATA 160 1 32 186 255 1
    73 83 159 133 63 173 84 159
    133 64,174 2032
76  1960 DATA 21 128 172 22 128
    169,63,32 216 255 76 60 110
    13 83 84,1652
15  1970 DATA 65 82 84 32 65 68
    68 82,63,13,0 13 69 78 68 32
    882
46  1980 DATA 65 68 68 82 63 13
    0 13 70 73 78 69 78 65 7 69
    549
93  1990 DATA 63 13 0 0 0 169 10
    6 160 159 141 24 3 140 25 3
    32,1038
28  2000 DATA 68 229 169 71 160
    111 32 52 131 96 72 138 72 1
    52 72 169 1794
D8  2010 DATA 140 160 159 32 30
    171,169 15,141,119 2 169 13
    141 120 2 1587
58  2020 DATA 155 2 133 198 104
    160 104 170 104 76 71 254 14
    7 83 83 83,1555
E2  2030 DATA 32,50 56 50 19 53
    0 32,32 32 32 32 32 32 32 32
    578
58  2040 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
FF  2050 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
D1  2060 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
B8  2070 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
30  2080 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
A7  2090 DATA 32 32 32 32 32 32
    32 32 32 32 32 32 32 32 32 3
    2 512
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PROGRAM MACPDDEMO

15  10 ! A SIMPLE DEMONSTRATION
    OF MACROS IN      ACTION
2A  11 !
0F  12 OUT 3
2C  13 !
3A  14 ! DEFINE MACROS INTO CURR
    ENT MACRO LIBRARY
2E  15 !
19  16 +CLS
F8  17 +PRINTAT
E8  18 +COLOUR
32  19 !
E1  20 ~~$C000
34  21 !
8F  22 START !
36  23 !
01  24 ! INVOKE THE MACROS
38  25 !
24  26 @CLS
50  27 @COLOUR 0 3 3
A3  28 @PRINTAT 10 10, TEXT TO B
    E PRINTED
3C  29 !
F3  30 RTS
AE  31 RUN START ! SET EXECUTION
    ADDRESS
D1  32 !
62  33 ! ONCE ASSEMBLED USE  G
    TO RUN THE OBJECT CODE
```

```
PROGRAM CONFIGURE

70  10 REM *** MACRO ASSEMBLER B
    ASIC CONFIGURE IAN GOFFE 198
    9 ***
60  20 INPUT "SAVE ASSEMBLER TO
    WHICH DEVICE  DEV
8A  30 DIM A$(8),V(8),V1(8),V2(8
    )
1D  40 RESTORE FOR L=1TO8 READA$
    (L) V(L) V1(L) V2(L)=PEEK(V(
    L))
98  50 IF V1(L)=1THENV2(L)=PEEK(
    V(L))+256*PEEK(V(L)+1)
92  60 NEXT L
7F  70 POKE53280 0 POKE53281 0
A1  80 PRINT  (CLR C7 SU,S038,SI
    J",
01  90 PRINT  (SG CB)MACRO ASSEM
    BLER U1 4 CONFIGURE PROGRAMM
    C7 SB)"
10  100 PRINT "(SJ SF38,SK)"
FC  110 PRINT '(C7 SU S038 S1)",

71  120 PRINT  (SG,CS,SPC61WRITT
    EN BY IAN GOFFE 1983(SPCS,C7
    )  (SS) ,
02  130 PRINT  (SJ SF38 SK)
36  140 PRINT (SPC3)FUNCTION(SPC
    11)ADDRESS  VALUE
71  150 FOR L=1 TO 8:PRINT  (YEL
    LOW)  L  (WHITE) ,A$(L)  (CB
    ) (V(L)  =  (V2(L)  )  NEXT
40  160 PRINT (DOWN,C7) S SAVE C
    ONFIGURED ASSEMBLER"
84  170 GET K$
38  180 IF K$<"1" OR K$> 9 THEN
    170
7C  190 IFK$="S"  THEN 310
9C  200 PRINT "(DOWN CB)ENTER NE
    W VALUE FOR (WHITE)" A$(VAL(
    K$))
20  210 INPU1 W
21  220 L=VAL(K$)
C3  230 IF W>255 AND V1(L)=0 THE
    N PRINT "MUST BE 8 BIT" FOR L
    =1TO1000 NEXT GOTO 40
5C  240 IF V1(L)=0THENPOKEV(L) W
     GOTO 40
54  250 Y=INT(W/256) A=W-(256*Y)

DC  260 POKEV(L) A POKEV(L)+1 Y
    GOTO 40
08  270 DATASYMBOLS START 33797,
    1 SYMBOLS LIMIT 33801,1
77  280 DATAMACRO DIR  START 338
    07,1,MACRO DIR  LIMIT,33809
    1
ED  290 DATAMACRO LIB  START 338
    03,1,MACRO LIB  LIMIT 33805
    1
E7  300 DATASTORAGE DEVICE 39788
     0,SYMBOL OUTPUT 33081,0
ED  310 INPUT  (DOWN,WHITE)FILEN
    AME ;F$
DE  320 PRINT (CLR)POKE43 0:POKE
    44 110 POKE45 0 POKE46,160"
EE  330 PRINT PRINT PRINT SAVE"
    CHR$(34) F$ CHR$(34)  " DEV

4D  340 POKE631 15 POKE632,13 PO
    KE833 13 POKE198 3
```

Give your Expert Cartridge a boost with this handy routine

By R. Drummond

MEMORY RESTORER

Attention *Expert* Cartridge users!

Have you ever tried to back up a program, only to find half way through loading it the computer suddenly resets or crashes?

Here is the solution to this aggravating problem *Memory Restorer*

How To Use

Program the *Expert* as normal and type 'N' to reset Load *Memory Restorer* by typing

LOAD "MEMORY RESTORER" (add ,8 for disk)

and then RUN it

When instructed switch off the *Expert* and press reset Now load the program to be copied, switch on the *Expert*, press RESTORE (press ESM if light is lit) and save as normal (type 'Z "program name")

How It Works

The 'N' command in the *Expert* clears the whole memory so that its compactor is as efficient as possible Unfortunately, some programs detect this change and cease loading This problem can be overcome by restoring the memory to its original power-up state (alternate 32 byte blocks of 255 and 0)

How To Enter

Switch the computer on and off (or enter *Expert* and type 'N') and then enter this line

POKE 44 16 POKE 4096,0 NEW

This raises the bottom of the Basic memory, so that the restorer can be poked in below it

Now type in the Basic loader entitled 'restorer base' and RUN it Correct any errors, and RUN it again

When it is finished, you will be asked which device you wish the program to be saved to Press '1' for tape or '2' for disk

Well, that's it The Restorer should enable you to load some previously unLOADable programs, but it still does not guarantee success in freezing

If you have any problems or suggestions to make, please contact me through *Your Commodore* or MBX me on *Compunet* **(RCD1)**

```
PROGRAM RESTORER BASE

01  10 A=2049 B=36.C=100
B2  20 FORD=0TO8 E=0·FORF=0TO7.R
    EADG
16  30 IFG<0ORG>255THENPRINT"ERR
    OR IN LINE",C+(D*10) END
BF  40 POKEA+(D*8)+F,G E=E+G NEX
    TF
3B  50 READG IFG<>ETHENPRINT"ERR
    OR IN LINE",C+(D*10)
02  60 NEXTD
40  100 DATA 16,8,196,7,158,50,4
    8,54,537
4D  110 DATA 54,58,82,67,68,49,0
    ,0,378
C9  120 DATA 0,169,11,141,32,208
    ,141,33,735
EF  130 DATA 208,169,15,141,134,
    2,169,23,861
0B  140 DATA 141,24,208,169,128,
    141,145,2,958
F5  150 DATA 32,68,229,160,0,185
    ,182,8,864
F4  160 DATA 153,0,4,200,192,34,
    208,245,1036
12  170 DATA 160,0,185,73,8,153,
    52,3,634
46  180 DATA 200,192,112,208,245
    ,76,52,3,1088
97  190 DATA 120,169,0,133,1,169
    ,0,133,725
FE  200 DATA 251,169,8,133,252,1
    62,248,160,1383
14  210 DATA 127,169,0,145,251,1
    36,192,63,1083
B5  220 DATA 208,249,169,255,145
    ,251,136,16,1429
D5  230 DATA 251,165,251,24,105,
    128,133,251,1308
80  240 DATA 165,252,105,0,133,2
    52,202,208,1317
E4  250 DATA 222,165,252,201,132
    ,240,214,160,1595
9A  260 DATA 55,133,1,160,0,185,
    128,3,665
7B  270 DATA 153,80,4,200,192,32
    ,208,245,1114
2F  280 DATA 76,124,3,0,84,21,18
    ,14,340
75  290 DATA 32,69,24,16,5,18,20
    ,32,216
A1  300 DATA 79,70,70,46,32,80,1
    8,5,400
0A  310 DATA 19,19,32,82,5,19,5,
    20,201
63  320 DATA 46,32,32,32,0,69,24
    ,16,251
F9  330 DATA 5,18,20,32,77,5,13,
    15,185
51  340 DATA 18,25,32,82,5,19,20
    ,15,216
6F  350 DATA 18,5,18,32,45,32,82
    ,67,299
B7  360 DATA 68,49,32,49,57,56,5
    6,32,399
7A  370 DATA 0,0,0,0,0,0,0,32,32

0A  380 DATA 228,255,201,43,240,
    9,201,50,1233
E2  390 DATA 208,245,162,8,76,24
    2,9,162,1111
53  400 DATA 1,169,1,160,0,32,18
    5,255,804
79  410 DATA 169,15,162,19,160,9
    ,32,189,755
31  420 DATA 255,169,1,133,251,1
    69,8,133,1119
B5  430 DATA 252,169,251,162,218
    ,160,8,76,1296
6A  440 DATA 216,255,77,69,77,79
    ,82,89,944
D9  450 DATA 32,82,69,83,84,79,8
    2,69,580
22  460 DATA 82,0,0,0,0,0,0,0,82

80  500 PRINT"[CLR]PRESS '1' TO
    SAVE RESTORER TO TAPE,"
01  510 PRINT"[SPC3]OR '2' TO SA
    VE TO DISK."
19  520 SYS2272
```

LOADERBUILDER

Create your own Basic loaders without effort for all those data statements

By J. Kinley

It's well past midnight, the masterpiece of machine code programming you've devoted many hours of your life to writing is finally bug-free and running beautifully. Filled with a longing to share your creation with your fellow man, you survey your arsenal of machine code development aids – editors, assemblers, loaders and the rest. If only you had an easy way of turning your work back into a nice, simple Basic loader that other users could type in.

Loaderbuild is just the utility you've been looking for. This program will take machine code (or any other numerical data) stored in the memory of your C64, and turn it into a Basic loader. This has a list of potential applications. Maybe you want to submit your code to a magazine for publication? A *Loaderbuild* loader is an ideal form of presentation. Your code will be turned into DATA statements with a checksum for each line, as an aid to anyone typing the loader into their own machine. You could also make use of *Loaderbuild* to share your programs with a friend who lacks your own development facilities. Perhaps you could use it just to keep your work in an easily accessible form. For whatever reasons, most machine code programmers should find *Loaderbuild* a useful addition to their collection of utilities.

The listing of the "DEMO" program is an example of a loader constructed by *Loaderbuild*. The start address for the machine code is automatically inserted into line 140, and the number of DATA lines calculated and entered into line 150.

The machine code data in question is then written into DATA statements, starting from line 200, with 16 items to each line. If necessary, the last DATA line is made up to full length with zeros. Every DATA statement is given a checksum as a guard against typing errors if the loader is keyed into another computer.

If you want to try "DEMO" out, enter it into your C64 then RUN it. There will be a brief pause while the DATA items are POKEd into memory in this case from location 49152 onwards. Now use SYS 49152 to run the machine code. OK, not very exciting, but serves to demonstrate the idea!

Using Loaderbuild

Loaderbuild is written in Basic. No problem if your machine code is in a 'safe' area of the computer (such as above location 49152). However, if your code is in an area normally used by Basic, then don't forget to reset top or bottom of Basic as necessary before letting *Loaderbuild* loose in your machine.

In case you don't know how, the limits of the Basic area are set using the following POKEs:

POKE 51, (bottom of BASIC, low byte)
POKE 52, (bottom of BASIC, high byte)
POKE 55, (top of BASIC, low byte)
POKE 56, (top of BASIC, high byte)

If you make any adjustments, follow them with a CLR to get the computer used to the idea.

Now load 'LOADERBUILD' and RUN it.

The program will ask you to input start and finish addresses for the code to be worked on. You can enter this information in either decimal or in hex (preceded with the customary $ sign).

Next tell the program the name under which the new loader is to be stored on disk – and that's it, the computer does the rest.

To use your loader, reset top and bottom of Basic if necessary (see above), then simply LOAD it from disk, where it will have been saved under the name you gave it, and RUN in the usual way.

How Loaderbuild Works

Lines 1000-2210

The input section for start and finish addresses and loader name. Calls subroutines at line 6000 to check against invalid entries, and 7000 to handle any input errors.

Lines 3000-3300

Sets up the Basic lines of the loader and writes them to disk. Inserts start address into loader and calculated number of DATA lines. Note variables KL and KH. These are pointers to the start of the next line in Basic, and must be calculated for each line. The actual Basic lines are in coded DATA statements, starting from line 10000. Repeated calls are made to subroutines at 8000 (which finishes construction of each Basic line and numbers it), and 9000 (which writes a Basic line to disk).

Lines 4000-4090

Compiles DATA statements, 16 items to a line. Fills last line with zeros as necessary. Calls subroutine at 5000 which finishes construction of the Basic DATA statement.

Lines 5000-5090

See 4000-4090. Calls subroutine at 9000 to write BASIC line to disk.

Lines 6000-6260

Checks start and finish addresses for following conditions -

Illegal characters
Entry too long
Invalid memory location

Also converts hex entries into decimal.

Lines 7000-7080

Prints error message and waits for a key to be pressed before continuing.

Lines 8000-8150 & Lines 9000-9050

See lines 300-4300.

Lines 10000-10150

DATA statements containing BASIC lines. All keywords are in tokenised form, flagged with # sign.

```
PROGRAM LOADERBUILD

64  1000 REM*********************
         ************
73  1010 REM** LOADERBUILD
                 **
70  1020 REM**
                 **
13  1030 REM** BY JB KINLEY  198
         3          **
5E  1040 REM*********************
         ************
51  1050 REM
58  2000 REM*********************
         ************
91  2010 REM** INPUT DETAILS OF
         PROGRAM   **
50  2020 REM** TO BE PROCESSED
                 **
3A  2030 REM*********************
         ************
C8  2040 POKE 53280 0   POKE 532
         81,0
B0  2050 PRINT "{CLR WHITE REV S
         N DOWN}CONVERT MACHINE CODE
         TO BASIC LOADER"
80  2060 PRINT " ------  -----
         ------ ------ ------"
62  2070 PRINT "{PURPLE,DOWN5,RI
         GHT31}-----{UP2}"
2F  2080 INPUT "START ADDRESS OF
         M/C PROGRAM{SPC8,LEFT7 CYAN
         }";IN$
C5  2090 GOSUB6000
55  2100 IFER$<>""THEN GOSUB7000
         :GOTO2070
CB  2110 CE=IN MS$=STR$(IN) IN$=
         ""
8A  2120 PRINT "{GREEN DOWN5 RIG
         HT31}-  -{UP2}"
52  2130 INPUT "END ADDRESS OF M
         /C PROGRAM{SPC10 LEFT7 CYAN}
         ";IN$
6F  2140 GOSUB6000
AB  2150 IFER$<> "THEN GOSUB7000
         :GOTO2120
41  2160 ME=IN MES=STR$(IN)
33  2170 IFME<CETHENER$="END ADD
         RESS LOWER THAN START ADDRES
         S" GOSUB7000 RUN
10  2180 PRINT "{RED DOWN7 RIGHT
         15} ------  ---  {UP4}
2C  2190 PRINT "PROGRAM NAME FOR
         BASIC LOADER"
D3  2200 INPUT "{DOWN RIGHT19}{C
         SPC17,LEFT10,CYAN}";PN$
25  2210 REM
4C  3000 REM*********************
         ************
45  3010 REM** SET UP LOADER PRO
         GRAM LINES**
6B  3020 REM** IN OUTPUT FILE
                 **
2E  3030 REM*********************
         ************
B7  3040 KL=1   XH=0  REM ** LIN
         K TO NEXT LINE
6E  3050 LL=50   LH=0  REM ** LI
         NE NUMBER
F7  3060 OPEN 2,8,2,PN$+",P,W"
F8  3070 PRINT#2 CHR$(XL) CHR$(X
         H)
CF  3080 GOSUB 6000  GOSUB 6000
B8  3090 GOSUB 6000
E5  3100 LN$=LEFT$(LN$ LEN(LN$)-
         1)+PN$+CHR$(0)
60  3110 XL=KL+LEN(PN$)  IF XL>2
         55 THEN XL=XL-256   XH=XH+1
         REM **SET LINE LINK
58  3120 GOSUB 6000
80  3130 GOSUB 6000  GOSUB 6000
09  3140 GOSUB 6000  GOSUB 6000
5F  3150 GOSUB6000
51  3160 LN$=LEFT$(LN$ LEN(LN$)-
         1)+MS$+CHR$(0)
5C  3170 KL=KL+LEN(MS$)  IF KL>2
         55 THEN KL=KL-256 : XH=XH+1
         REM **SET LINE LINK
7E  3180 GOSUB6000
57  3190 GOSUB6000
04  3200 NO=VAL(MES)-VAL(MS$)+1
E0  3210 NL=INT((NO+15)/16) 1
57  3220 NL$=STR$(NL)
3A  3230 NL$=RIGHT$(NL$,LEN(NL$)
         -1)
F5  3240 LN$=LEFT$(LN$ LEN(LN$)-
         1)+NL$+CHR$(0)
04  3250 XL=XL+LEN(NL$)  IF XL>2
         55 THEN XL=XL-256   XH=XH+1
         REM **SEI LINE LINK
4E  3260 GOSUB3000
20  3270 FORR=1TO4
48  3280 GOSUB3000  GOSUB3000
64  3290 NEXT
7F  3300 REM
20  4000 REM*********************
         ************
E8  4010 REM** COMPILE DATA LINE
         S      **
4C  4020 REM*********************
         ************
D8  4030 DE=1 CS=0
37  4040 LL=LL+10   IF LL>255 TH
         EN LL=LL 256 : LH=LH+1 : REM
         **INCREMENT LINE #
05  4050 LN$=
75  4060 BY=PEEK(CE) CS=CS+BY:BY
         $=STR$(BY)
F6  4070 BY$=RIGHT$(BY$ LEN(BY$)
         -1)
B0  4080 LN$=LN$+BY$+"
EF  4090 CE=CE+1 IFCE>METHEN4130
00  4100 DE=DE+1 IFDE<17THEN4060
19  4110 GOSUB5000
28  4120 GOTO4030
03  4130 DE=DE+1
6A  4140 IFDE>16THENGOSUB5000 GO
         TO4170
82  4150 LN$=LN$+"0,
5F  4160 GOTO4130
47  4170 PRINT#2,CHR$(0) CHR$(0)
         CLOSE2
E4  4180 END
E1  4190 REM
14  5000 REM*********************
         ************
C2  5010 REM**COMPILE BASIC DATA
         STATEMENT**
20  5020 REM*********************
         ************
8E  5030 CS$=STR$(CS)
5F  5040 CS$=RIGHT$(CS$ LEN(CS$)
         -1)
46  5050 LN$=CHR$(LL)+CHR$(LH)+C
         HR$(131)+LN$+CS$+CHR$(0)
23  5060 OL=LEN(LN$)+2
B5  5070 KL=KL+OL   IF XL>255 TH
         EN XL=XL-256   XH=XH+1   REM
         **SET LINE LINK
EF  5080 GOSUB5000
78  5090 RETURN
0B  6000 REM*********************
         ************
B5  6010 REM** INPUT VALIDATION
                 **
14  6020 REM*********************
         ************
0F  6030 IN=0 ER$=
AE  6040 IFLEN(IN$)>STHENER$="EN
         TRY TOO LONG" GOTO6260
58  6050 IFLEFT$(IN$,1)= "$"THEN6
         130
6B  6060 IN=VAL(IN$)
80  6070 FORT=1TOLEN(IN$)
B0  6080 IFMID$(IN$,T 1)<"0"ORMI
         D$(IN$,T,1)>"9"THENF=1
63  6090 NEXT
F7  6100 IFF=1THENER$="INVALID C
         HARACTERS IN ENTRY  F=0
02  6110 IFIN>65535THENER$="MEMO
         RY LOCATION OUT OF BOUNDS
E4  6120 GOTO6260
9F  6130 SL=LEN(IN$) 1
62  6140 IN$=RIGHT$(IN$ SL)
65  6150 FORT=1TOSL
1E  6160 TS$=MID$(IN$ T 1)
1E  6170 IF(TS$>= "0"ANDTS$<="9"
         OR(TS$>= "A"ANDTS$<="F")THENG
         150
EB  6180 ER$="INVALID CHARACTERS
         IN ENTRY"
41  6190 NEXT IFER$<> "THEN6260
94  6200 FORT=0TOSL 1
01  6210 CV$=MID$(IN$,SL 1) SL=S
         L 1
81  6220 IFCV$>= "0"ORCV$<="9" THE
         NCV=VAL(CV$)
52  6230 IFCV$>="A"ANDCV$<="F"TH
         ENCV=ASC(CV$)-55
5C  6240 IN=IN+CV*16^T
D0  6250 NEXT
0E  6260 RETURN
FC  7000 REM*********************
         ************
C1  7010 REM** INPUT ERROR HANDL
         ING      **
DB  7020 REM*********************
         ************
16  7030 PRINT"{DOWN3,RED}"ER$
F4  7040 PRINT"{DOWN2 C3,SPC7}PR
         ESS ANY KEY TO CONTINUE"
DB  7050 GETXX$ IFXX$=""THEN7050
CB  7060 PRINT"{UP SPC35}"
55  7070 PRINT"{UP4,SPC35,UP3}"
40  7080 RETURN
00  8000 REM*********************
         ************
BD  8010 REM** ADD STRING DATA I
         O PROGRAM **
FC  8020 REM*********************
         ************
A1  8030 LL=LL+10   IF LL>255 TH
         EN LL=LL-256 : LH=LH+1   REM
         **INCREMENT LINE #
EF  8040 LN$=""
57  8050 READ DA$
C7  8060 IF DA$= #"THEN8110
B4  8070 IF LEFT$(DA$ 1)<>"#" THE
         N8100
CE  8080 DA=VAL(RIGHT$(DA$ LEN(D
         A$)-1))
51  8090 DA$=CHR$(DA)
B4  8100 LN$=LN$+DA$ GOTO8050
C7  8110 LN$=CHR$(LL)+CHR$(LH)+L
         N$+CHR$(0)
23  8120 OL=LEN(LN$)+2
B9  8130 KL=KL+OL   IF KL>255 TH
         EN KL=KL-256   XH=XH+1   REM
         **SET LINE LINK
65  8140 RETURN
7A  8150 REM
C4  9000 REM*********************
         ************
F2  9010 REM** WRITE LINE TO PRO
         GRAM FILE **
00  9020 REM*********************
         ************
F6  9030 PRINT#2 CHR$(XL) CHR$(X
         H) LN$
F0  9040 RETURN
```

SCREEN SAVER

Give your Monitor/T.V. Screen a rest with Screen Sever

By G. Gornu

How long does your computer system remain switched on and unattended during a programming session? Probably long enough to gradually wear down the C R T (Cathode Ray Tube) in your monitor

During all this time the poor CRT is getting sunburnt by the electron gun! One solution is to switch off the monitor during such intervals This is not recommended due to the current surges occuring at each switching on or off which could corrupt your program

Here is a "soft" solution It is a simple interrupt driven routine devised to limit the damage It will 'black" the screen if the keyboard is ignored for about one minute

How It Works

Every 1/50th of a second the program checks if a key has been pressed. If not it decrements a counter, if the counter has run down to zero then it saves the border colour sets it to black, and "switches off" the screen This is done by turning off bit 4 location $D011 (53265), which changes the whole screen to the border colour

The next time a key is pressed the same bit is turned back on, which restores the screen The saved value of the border colour is restored too, and the counter is reset to its starting value calculated for a delay of approximately one minute

The routine occupies memory from $CFAA (53162) to $CFFF (53247)

To Use It

Type in *Screen Saver,* and save it before attempting to run it because it will destroy itself once the machine code is poked in memory

Before starting programming, or loading a program, load "screen saver" and run it There is one little drawback, the border colour can't be changed once the routine is operating Also note that "Screen Saver" will not work with any program which changes the interrupt vector at $0314 Pressing RUN-STOP/RESTORE will disable the routine To restart SYS 53162

```
F2  5050 REM
5E  10000 REM*****************************
    ************
01  10010 REM** DATA AREA
                 **
EE  10020 REM*****************************
    ************
5E  10030 DATA "#143"   ** BASIC
     LOADER FOR PROGRAM"   #
7E  10040 DATA  "#143" " ** "   #"

52  10050 DATA "#143" " ** COMPI
    LED USING  LOADERBUILD  UTIL
    ITY  "#"
6H  10060 DATA  "#143 ,' ** BY J
    KINLEYCSPC331388   #
0F  10070 DATA  5' '#174" "#"
0F  10080 DATA  "#123' "L', #178"
    ,"D" "#164', #"
FF  10090 DATA  "C","#178","D ","
    #125" "D  "#178 ,'O','#164"
    "15  #"
33  10100 DATA "#135   A;C","#17
    8 , C' "#170","A ","#151 ,'S
    ","#170 ,"L"  #172"
DS  10110 DATA "16","#170" "D,A
    " "#130 ,"#"
86  10120 DATA  "#135","A " "#138
    " "A" "#178", #177" "C","#16
    7" "#153"
CF  10130 DATA "#34","CKECKSUM E
    RROR IN LINE   #34"   200",
    "#170' "L" "#172
30  10140 DATA "10   "#144   #
54  10150 DATA "#130 ,"#"
```

```
PROGRAM DEMO

6B  100 REM ** BASIC LOADER FOR
    PROGRAM
0E  110 REM ** DEMO
F2  120 REM ** COMPILED USING  L
    OADERBUILD  UTILITY
85  130 REM ** BY J KINLEY   198
    5
6A  140 S= 49152
0B  150 FORL=0TO6
20  160 C=0 FORD=0TO15
C0  170 READA C=C+A POKES+L*16+D
    A NEXT
30  180 READA IFA<>CTHENPRINT"CH
    ECKSUM ERROR IN LINE ' 200+L
    *10 STOP
3C  190 NEXT
C1  200 DATA160 0 185 35,162,240
     7,200 32,210,255,76,2,162,3
    2,224 2045
5E  210 DATA255,201 0,240 248,20
    1 42,240 9 238,32,208,238,33
     208,76,2470
CC  220 DATA14,152 96,80 02,69,8
    3 83 32,65,32,75 69 89 32 04
     1177
0A  230 DATA78 32 67 72,65,78,71
     65 13 66 73,82,69,65,82,32,
    1024
D6  240 DATA65 78 68 32 83,67,82
     65,69 78 32,67 73,76,79,85,
    1105
F1  250 DATA82 03 13 13 13 80 82
     69 83 83 32 42,32,84,75,32,
    502
FE  260 DATA83,88 73 04 0-0 0,0,
    0,0 0 0-0 0 0-0 314
```

```
PROGRAM SCREEN SAVER

C8  100 REM   ******************
    **********
D5  110 REM   *
              *
70  120 REM   *        SCREEN SAVE
    R         *
C8  130 REM   *              BY
              *
D9  140 REM   *        GERARD CORN
    U         *
3D  150 REM   *
              *
0F  160 REM   ******************
    **********
25  170 REM
32  180 PRINTCHR$(147), A0=53182
     FOPI=A0105247
F2  190 READA C5=C5+A;POKE1 A;PR
    INT" "; NEXT
A8  200 IFC5<>1171ETHENPRINT"DAT
    A ERROR   END
F9  210 SYSA0 PRINT"SCREEN SAVER
     INSTALLED "
7E  220 NEW
48  230 DATA120 169 169,160 207
    141,020 003
56  240 DATA140 021,003,088 173
    032 208 141
11  250 DATA255 207 096,169 187
    041 064 240
13  260 DATA032,208 253 207 208
    024 206 254
F9  270 DATA207 208 015 173 032
    208 141,255
95  280 DATA207,169,000 141 032
    208 173,017
65  290 DATA208,041 239 141 017
    208 076,049
5C  300 DATA234,173 017 208 009
    016 141 017
A7  310 DATA208 173 255 207 141
    032 208 169
FA  320 DATA015 141 254 207 169
    000,141 253
84  330 DATA207 240 227 000 015
    000
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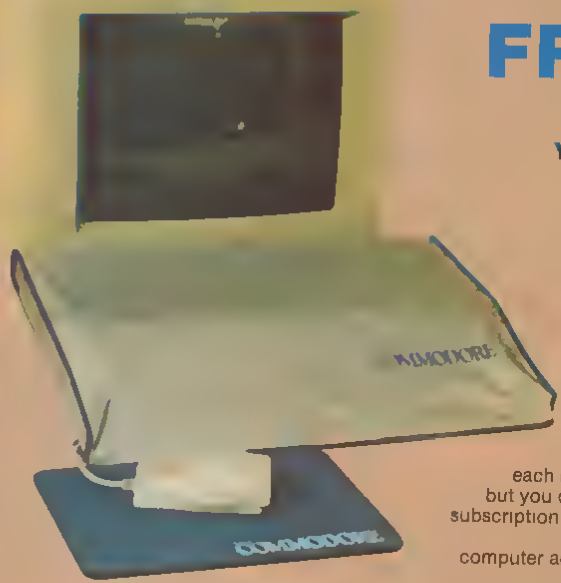

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UNLISTED ITEMS
Deduct 5% from RRP of Full Price Software
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Deduct 5% from RRP of Compilation Add-Ons
SEND SAE FOR FULL LIST

Stock limits usually set by return and Large Cheques subject to clearance! NOTE Unfortunately there are sometimes goods which have just been released on time. Such FORTHCOMING RELEASES will be sent on Day-of-release. (We will gladly refund or send alternatives for any item which is excessively delayed)

HACKATAK

Welcome to the radical new tips section, where you can find the latest games mapped, poked and pulled to bits by me, your tipsmaster Kirky Baby. You may notice that some of the games featured in these pages are a wee bit old, but as I write the PC Show is only two days. Fear not folks I'll be getting the latest software and hacking it to pieces to next month's Hackatak will be BIG!!!

Samurai Warrior

Having trouble with your bunnies? Simply type HHDSFHHH on the high score table for infinite energy. Wow!

Captain America

La la la la la la America. If you want extra lives for this slightly (!) disappointing conversion keep pressing the bottom (Ooer!) button on the control panel and you'll receive another captain.

Renegade III

Get to level two and then kill yourself (or rather the renegade). When you have lost all your lives, you will be asked to rewind the tape. Just press the space and level three will load. Well I never!

Rambo III

Yet another cheat (I'm too good to you lot). Type

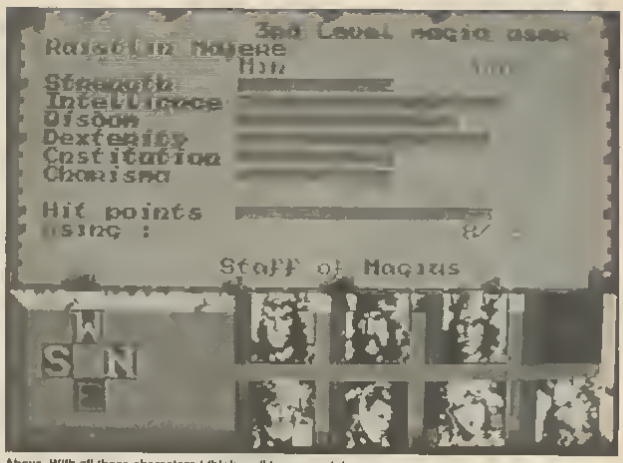
RENEGADE on the highs core table, press 1, 2 or 3 to start on any of the three levels

Dragon Ninja

When you lose all your lives on the forth level, ignore the 'rewind tape' message, leave the tape playing and level five will load You will have five lives and full time Da naa!

Heroes of the Lance

Yes, this is a wee bit old, but as yet no other magazine has printed a complete solution, until now! Just follow the directions given using the game's on screen compass



Above With all those characters I think we'll have a party!

LEVEL 1
First, enter door (south) Walk south until you reach the scroll Enter door (east) Walk east Enter door (north) Walk north Enter door (west) Walk west Enter door (north) Walk south Enter door (west) Enter second door (west) Take scroll then leave (north) Go back to first door and enter (west) Walk west and take the gold Walk east Enter door (north) Walk south and enter the round hole in the wall (west)

LEVEL 2
Walk east Enter door (south) Walk south Enter door (east) Walk south Tall off the gems and potions Walk south Take shield Walk north Enter door (west) Walk south Enter door (west) This should take you to the waterfall and cure all your wounds Walk south Jump gap Walk south Take gold cup Walk south Enter second door (west)

LEVEL 3
Walk south Go past door Walk south Take potion Walk north Enter door (west) Walk south Take shields Enter door (west) Walk north Enter door (west) Walk north Enter door (west)

LEVEL 4
Jump gap (Hint, try over stepping the mark!) Walk west Enter door (south) Walk north This is a very hard screen, select Tasslehoff Burrfoot (Hint when the arrows start to fly jump to get by) When you have passed the fire enter the door (south) Walk south Enter door (east) Walk east Enter door (north) Walk north Enter door (west) Walk south Take gold and silver cups Take four potions Take scroll Walk north Enter door (west) Walk west Take rings Use rings Walk east Enter door (south) Enter door (east) Walk south Enter door (west) Walk west Enter door (south) Walk south Enter door (west) Save the game here Select Riverwind Now jump the gaps, again, try over stepping the mark When you have jumped all the gaps enter the door (east)

LEVEL 5
Walk east Enter door (north) Walk south Enter door (east) Take coins Walk west Enter door (north) Walk south Enter door east Walk east Enter door (south) Enter 4th door Walk east Enter door (north) Walk south Enter door (east) Walk east Enter door (north) Enter door (east) Walk east Take potion Walk east Enter door (north) Walk north Enter east Walk east Keep your eyes open for a round hole in the wall this is the entrance to LEVEL 6

The Dragon's Lair
As soon as you enter the lair hit the space bar Select Goldmoon, and return to the game You can only kill the dragon by throwing the Staff at him Just hold down the fire button and push the joystick diagonally up When you have disposed of him run left avoiding the falling rocks and take the Disc's to finish the game

Sorry people, that's all we have time for Next month when the PC Show is well and truly over, I'll have LOADSATIPS, so tune in for an action packed HACKATAK next month or you may regret it, not now but soon and for the rest of your life!

Kirk Rutter

Above Go east go east CHOMP! Er– go west, go west.

Above Amanda Barry, put your clothes back on this instant!

SEQUEL OR BUST!

'Who ya gonna call *this* time?" "*Now* who ya gonna call?' "They're here to save the world *again*" 'They're back to save the world" the possibilities of crummy by lines are seemingly endless Yes, after five quiet years the Ghostbusters heroes of the world's biggest grossing comedy ever are back. But for Columbia Pictures, eager for a box office success to mop up the worry left by a string of flops it hasn't been easy

In 1982 Ivan Reitman (currently one of Hollywood's hottest comedy properties after success such as 'Legal Eagles', 'Screwballs', 'Stripes', 'Animal House and 'Twins') pulled together Saturday Night Live' star Bill Murray, 'Blues Brothers maestro Dan Aykroyd talented actor writer director/producer Harold Ramis and Academy Award darling Sigourney (Aliens) Weaver for a big budget film comedy about four psychic investigators who start a rather jolly exorcism business, Ghostbusters Inc The film which cost twenty million dollars to make, went on to gross $220 million, pretty much guaranteeing a sequel in one form or another, particularly in the light of Hollywood's current obsession with Roman numerals ('Friday 13th Part IX', A Nightmare on Elm Street V1 Batman II' 'Blade Runner II (being filmed on the Batman' set), Alien IV' (with Arnold Schwarzeneggar and Sigourney Weaver already signed), 'Spaceballs III The Search for Spaceballs II' and 'Star Wars I The Clone Wars are all in the pipeline) However after the worldwide furore of the first picture's success had died down everything went quiet Ex-Columbia Pictures head David Puttnam showed a noted lack of enthusiasm for 'Ghostbusters II even to the point of considering making it with an all new low-budget cast Puttnam's much publicised enmity with star Bill Murray, the leader of the Ghostbusters obviously didn't help, and it wasn't until late 1987, when Puttnam was deposed as studio boss that 'Ghostbusters II' cropped up again Puttnam's replacement, a Hollywood power player named Dawn Steel, recalls it as "one of the first things we talked about" at her interview for the corporation's presidency. Not surprising, since it was obviously crucial to the ailing studio that the movie got made Six flops in one year (1988) – including the anticipated smash success 'Punchline' (with Tom Hanks and Sally Field), which grossed only $21 million left Columbia Pictures with a lot of problems, both in financial terms and in the box-office credibility stakes

Despite the usual sure fire success of sequels to big movies, the sheer volume of genre movies on the Summer market might just have left "Ghostbusters comfortably profitable but not, ultimately a massive hit. Studio boss Steel called the movie "the most important sequel in the history of Columbia Pictures" and it's easy to see why It was a predictable but necessary evil for the corporation one requiring a big investment and, therefore a big risk The had got to be made The formula had to be repeated The cast and crew in the original movie had to be involved But how were they all going be got together?

The story of how it happened began much like the plot of 'Ghostbusters in which the protagonists of the original have left 'busting behind and come back to some semblance of normal life The same was true of most of the cast and crew from 'Ghostbusters. Murray had appeared in several

dismal films (including 'Scrooged' in 1987) and had subsequently dropped out of sight, Aykroyd's 'Spies Like Us', 'Doctor Detroit', 'Dragnet' and 'The Couch Trip' were all awful, Ramis had written, directed and/or appeared in several teen movies with some success; director Ivan Reitman was filming Schwarzenegger and DeVito (tipped to be Penguin in Batman II') in 'Twins', female lead Weaver was enjoying critical success herself, earning Oscar nominations for 'Aliens', 'Gorillas in the Mist' and 'Working Girl' The man who brought them all together was none other than Michael Ovitz, 'the King of Hollywood' (actually head of the famous Creative Artists Agency of Los Angeles)

What happened at their lunchtime meeting in Jimmy's (a Beverly Hills showbiz restaurant) was the first step towards making 'Ghostbusters II' As Murray recalls, 'Walking into the meeting no-one really felt we's make the movie But in the course of lunch we had so many laughs and so much fun that it became clear we'd really enjoy working together again " A year of deal making later the sequel was rolling with virtually the entire cast of its predecessor, even down to the 'Busters' long-suffering (ex)-secretary (played by Annie Potts) and accountant-cum attorney (Rick Moranis) The delectable Sigourney Weaver reprises her role as Dana, Bill Murray's on-off girlfriend in the first movie, since when Dana has married, had a child and divorced and actually gets the group 'busting ghosts again when strange things start happening to her baby boy, Oscar She admits to being "a bit bewildered" by her comedian co-stars, saying "It's like being put in a class with awful boys, who spend all their time throwing spitballs and dunking your braids into the inkwell It's a streak of masochism for me I just find it wonderful "

The film is being shot on a $30 million budget, kept low by Murray, Aykroyd, Ramis and Reitman working for a profit-share wage rather than their customary up front fee an idea suggested by Reitman after testing it with Schwarzenegger and DeVito on 'Twins' Dawn Steel is quoted as saying that 'Ghostbusters II could have cost "close to $50 million" had the stars taken their wages in advance ' We'd much rather pay a piece of the profits than huge salaries,' she says "That way we're saying 'take the risk with us Then we're partners '" Risk? Surely a sequel to a $220 million movie isn't risky? ' It's pretty scary," Steel demurs "because the Summer is so jammed with product ' Indeed, 'Batman', 'Star Trek V' and 'Indiana Jones and the Last Crusade' were all vying for a piece of 'Ghostbusters II's audience

Ms Steel and the others involved in the film needn't have worried, as it turned out 'Ghostbusters II opened to a phenomenal audience reaction smashing all the box office records 'Indy III' had broken mere weeks before (Batman and 'Lethal Weapon 2 were to bust the records again only weeks later.) At the time of writing nearly three months before it opens on this

Above You shouldn't pee into an electric urinal

Above "Just blow into this, Mr Painting Bad guy

Below Ho, ho, ho, and a steaming ghost trap!

Right: "Are you sure we need all this protective gear to swim in the North Sea?"

side of the pond, Ghostbusters II has earned a cool $100 million (which statistics fans, is *half* the entire take of Ghostbusters' in *one twentieth* of the time) despite lukewarm reviews everywhere. Aykroyd and Ramis would again write the script, giving themselves the unenviable task of bringing the 'busters back with a fresh story. "None of us had ever done a sequel," Ramis says, "although we'd had offers on virtually every film we'd worked on. But then we started thinking if we could come up with a concept that seemed worthy, that really progressed us in some way, that had something new to say, then we'd do it." Aykroyd and Ramis, along with Reitman, 'played with many different permutations of what happened to the Ghostbusters after the first movie, and we finally settled on something that would seem meaningful for all of us, and that's what we pursued."

The film opens with the four 'busters gone bust (sic), having been made to pay for the mess they made in the first movie. Peter Venkman (Murray) is hosting a psychic-phenomena cable-TV show called 'Wow! People'. Ray Stantz (Aykroyd) and Winston Zeddemore (Ernie Hudson) are reliving their Ghostbusting days at childrens' birthday parties. Ego Spengler (Remis) has

Right: "Do you always do it this way?" "No. I sometimes wear wellies!"

buried himself into his work, obsessed with his research into the effect of human behaviour on ectoplasmic slime. The script drags them back together for a battle against slime and spirits revived by negative human behaviour. To beat the spooks this time the team have to convince everyone in New York that they have to be nice to each other for forty-eight hours otherwise the sticky stuff will take over the city. "The moral issue was important to us," says Ramis. The final showdown takes place at ... where else? ... the Statue of Liberty with 'Star Wars' effects wizards Industrial Light & Magic returning to provide the film with the ghosts and ghouls. Visual effects supervisor Dennis

Above: Get ahead of the statue of Liberty

Muren was asked, among other things, to come up with a ... of slime and spooks that were 'interesting'. In addition to being vapurous and flying around, the ghosts can change their shape easily as they move with a lot of what we call 'squash and stretch.' Sounds fun.

Yup, the Ghostbusters are back. A clever new symbol, some wicked-looking new proton packs, a brilliant theme song by Bobby Brown, every bit as catchy as Ray Parker Jr's 1984 smash title song, a slinky new dress for Ms Weaver, a souped-up new Ectomobile (the Ghostbusters' Cadillac-ambulance private transport) with dozens of roof lights and new computerised signboards, 100,000 gallons of slime, plus a gengeful villain in the form of Slimer all ad up to make 'Ghostbusters II' every bit as much fun as the first picture. And there is no reason to suspect that this outing for the dynamic quattro will be the last, for I'll bet that 'Ghostbusters II' will go on to make even more money than Ghostbusters'. Shares in Columbia Pictures will be rocketing again, and plastic proton packs will be appearing in toy stores all over, sending the merchandise manufacturers' dividends up as well.

So, who ya gonna call? Your stockbroker.

GHOSTBUSTERS II

THE PREVIEW

Let us drift back Back to when Activision UK was but a small branch of a large American company Back to when Dave Crane was a top leisure programmer Back to when Ghostbusting was all the craze

Five years later Columbia and Activision have done it again but how can either of them hope to top the biggest grossing comedy of all time and the best selling computer game? With Ghostbusters 2, of course

Over 2 million units have been sold since Ghostbusters came out, and quite rightly so It had strategy arcade action, and a feel of urgency just added for good luck But the market has changed the consumers are now younger and the computers have grown up Ghostbusters 2 would not have worked had it been similar to the first It would not have worked if there was too much strategy and not enough arcade qualities Thankfully it does work, as it is a game suited for the 1990s

It follows the film plot closely, focusing in particular on the section where Dan Akroyd descends into the bowls of an overrun city via the sewers Along the sewer walls are several nasties that try to slime, slice and dice him, although he is well endowed with a photon pack of his very own Whilst being lowered down you must vapourise the ghoulies, although this has got to be done within a time limit Also within your backpack is an assortment of extras to aid you in your task

The game is to be released in conjunction with the film on the 1st December and will appear on C64, and Amiga. A PC version is imminent If it proves half as successful as its predecessor half will be flying in the Activision office (what say we're looking at the Christmas number one?)

Large Stiff Cardboard Compo

To celebrate the launch of Ghostbusters 2 Activision are giving away a rather unique prize

If you've ever been to the cinema and have drooled over the large cardboard 3D cutouts that advertise movies, have no fear YC's here

You can win the Ghostbusters 2 version of a cutout which stands over 3 foot tall if you answer these simple questions

1. What is the name of Bill Murray's character in the movie?
a) Peter Venkman
b) Paul Plonkman
c) Cecil Parkinson

2. What is the name of the green, slimey ghost featured in both films?
a) Blatter
b) Slimer
c) Harvey Proctor

3. Who directed both films?
a) Stephen Spielberg
b) Ivan Reitman
c) Jeffery Archer

Send your entries on the back of a postcard (or sealed envelope) to

Who ya gonna call compo, YC, Argus House, Boundary Way, Hemel Hempstead, HP2 7ST

The closing date is 31st December 1989, and the first correct entry pulled out of the cauldron on that date will receive the cutout

(Ab)normal Compo Rules Apply!

COMPUTER AUCTIONS

Above And the bid from the spotty geek in the corner is..."

Below "Who will buy this second hand toilet roll?"

When the Ed asked me to go to an auction I imagined *Christies* and *Sotheby's*, not some pokey college hall at **Southgate College of Technology** in North London Still the journey wasn't too bad and I got there in good time "Take some photos", he said so I lugged my camera along as well

You can imagine the looks I got when I entered the steamy, overflowing hall As I walked past heads turned to regard this spectacle of a man with a camera as though I had three heads and a Nikon I pushed my way through the hordes of people until I could see what was happening at the front Looking around the overfilled room, I saw people, more people and more people, and then a computer! And another, and a printer, a monitor stacks of boxes and even more kit than I've got at home rather a lot

Advancing towards a smart looking *Star LC 10* printer I brushed past a friendly chap who said that the auction was about to start in a minute or two and I had better get myself a catalogue He waved a wodge of paper at me I thanked him and struggled towards a seething mass of people congregated at the front of the hall Joining a queue, a man with a moustache sat himself down on a chair on the stage, cleared his throat and spoke into a microphone "The sale will start in five minutes May I remind everyone that if you want to bid for anything in today's sale you must register at the front," he pointed to the queue I was standing in

At the front, I was given a card to fill in with my name and address

just to make sure that if I bought something and then ran off without paying for it they could track me down The top of the slip was torn off and handed to me Scrawled on it was "379" my bidders number "Are you taking photos for anything in particular?" a man in a red jersey asked as I requested a catalogue I told him of my involvement with a certain computer magazine as I handed over £1 for the catalogue As he noticed this he gave me the money back and told me to enjoy myself

The crowds had now retired to a bundle of seats directly in front of the stage and the gangways along the sides were now more navigable Looking around there were benches and more benches literally overflowing with computer bits and bobs Behind the seats were more rows of benches On one sat various portable computers with odds and ends hiding between, on another the odds and ends ruled and complete machines were a minority It soon became evident that there were not enough benches and equipment was begining to spill over onto the floor Still people swarmed around virtually everything lifting it, shaking it, switching things on and trying them out This kind of behaviour is encouraged by the auctioneers so that you know exactly what you are buying and wheter it works or not. You have no come back on the equipment, and everything is sold "as is"

10 30am and the sale began with lot one a set of IBM guide to operations software My initial reaction was, who the hell wants that, but it soon became apparent that quite a few people did Lots two to ten were the same as lot one and by the time the last one was sold the price had dropped considerably Next came three lots of IBM BASIC software which gathered little interest The first 40 items in the sale were all software, and the first bit of hardware was a IBM AT compatible mouse – whoopedo! As I leaned against a wall with no prospect of sitting down for a good two hours, I thought just how boring this experience could be I scanned the 13 pages of the catalogue and discovered to my horror, that there were 1203 lots on sale that day, with many additionals on separate sheet which I picked up In 20 minutes, just 30 odd lots had been sold and I was not looking forward to the prospect of staying for the rest of the day

At the bottom of the first page were lots 65 to 104 which were a collection of various D-RAM chips These came and went at ridiculously low prices considering the current value nine 256K chips for just £28 Turning the page I scanned down through the list of things and found myself ticking off items which I was interested in ' Lot 119 is a new Amstrad PC1640 system with 20MB hard drive and ECD monitor Who will bid £600?' No takers '£500' those sitting began to fidget but no bids were made '£400' the auctioneer's voice took on that "stingy sods ' tone Getting fed up with the inactive audience he reduced the price to "£300" This time there was much mumbling and the buyers were obviously becoming interested I heard someone close to me say "If it goes to £200 I'll have it " me too I thought and it did, "£200", the auctioneer was obviously becoming bored with this

A hand shot high into the air, it was mine! Then someone close by raised his hand "£220, do I see £240?" another hand rose and the bidding became fast and furious I would have had better luck with an arcade coin op The system was finally sold for £425

Lot 146 and a *Star LC 10* printer Bidding began at just £40 and rose to only £95 I bidded for this too, but considered £95 just a little too much for a whim and gave in on this too By the time lot 148 came up a NEC P6 24-pin I was in the swing of things and really beginning to enjoy myself

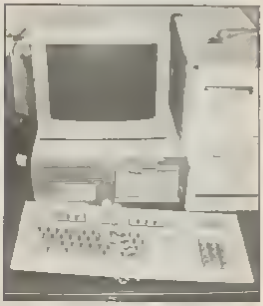
At the end of the day I came home with 30 blank 3 5 inch discs, these cost just £6 per ten, a telephone Psion Organiser II, an Atari 8-bit cassette recorder I only paid £3 for this some printer ribbons and a steel under-desk keyboard shelf

The auction I attended was organised by **John Russell & Co** who are based in Croydon, Surrey However, there are various other companies around the country who organise computer auctions, the more notable ones are listed below, others advertise in various journals All items in the auction unless stated otherwise in the catalogue are subject to VAT which is added to your bill

The auction turned out to be great fun I came away wanting to go to the next one so I'm off this Saturday to Mitcham and to the next auction I probably won't buy anything, but it's fun all the same It's interesting to talk to different people, and many bidders are regulars so you can make new friends and enjoy your hobby that little bit more

Andrew Banner

Above An abundance of goods for all to see



Above My what a mighty fine floppy drive you have!

Auctioneers

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ON THE HOME RUN

Accolade and YC have teamed up to bring you yet another chance to win loads of goodies. This is to celebrate the enormous amount of games to come our way from the company responsible for Test Drive and others.

Two lucky winners will receive an Accolade T-shirt, Baseball cap and a rather rare miniature baseball bat. Ten runners up will get a humungous poster of a pretty girlie to put on their bedroom ceiling.

All you have to do to be in with a chance of winning is answer the following three questions.

1. What is the name of the prequel to Hardball II?

2. What is the name of Accolade's best selling American football game?

3. Who is the major golf star currently sponsoring Accolade's Greatest 18 Holes of Major Championship Golf?

Scribble (in legible handwriting) the answers on the back of a postcard (or sealed envelope) and send them, by **30th December**, to

Amazing Accolade Compo, YC, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST

The Slightly Deranged But Strictly Correct Rules

Entries will not be accepted from employees of Argus Specialist Publications or Accolade. This restriction also applies to employees families, agents of the companies, and martians called Nigel.

The entry restrictions form part of the rules and the Editor's decision is absolutely, with no room for argument or bribery (well, argument anyway!), final. No correspondence will be entered into, nor will dark alleyways lodging creepy crawlies. In the event of a solar eclipse, we reserve the right to use a piece of smoked glass.

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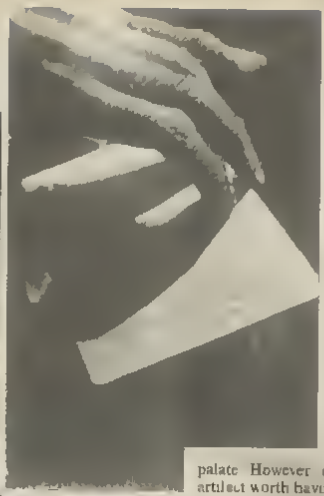
DON'T BELIEVE THE HYPE

1989 started with the comic industry reeling from the success achieved by *The Watchmen* and *Dark Knight* and the world gearing itself up for the arrival of *BATMAN*.

Of course by this time you're all quite sick of reading about *Batman/Bathype* and the great *Batman* in general, but no round-up of last year would be complete without it. And, I'm afraid, a little scene setting is in order before we get to know each other better.

Bathype was an exercise in damage limitation and image control rivalling Chinese efforts post-Tiananmen Square. The message *Batman Is Coming* penetrated right to the depths of our consumer hearts. By August 11th, the only licensed image you could buy of a character fifty years old were those that came directly from Tim Burton's film. Firstly, Robin was killed of a in a perfunctory little epic called *A Death In The Family* (DC) that grabbed world headlines. Fifty years of teen icon were buried in a howl of commercial anguish. 'What are we gonna do with all these lunchboxes with Robin on them now?' cried more than one distraught DC exec.

Warner insisted that anything that contradicted their desired 'R' rated Batman should be witheld from the schedules, thus Grant Morrison/Dave McKean's *Arkham Asylum*, wherein the lunatics – the Joker, Two Face, the Penguin et al – take over, was pulled and censored, finally released when the video was safely in the corner shop. Alas, we shall never see Morrison's interpretation of The Joker, complete with stilletos, stockings and Madonna like basque – lost forever to the demands of marketing and the sensitive American



palate However enough did escape the censors to make this the only Bat artifact worth having

Finally, *Warners* instructed by law suit and copyright that there were to be no images that contradicted the greater *Warner* way, ie anything that let you in on the fact that Batman was something over 5'3", and the Joker something less than 14 stone

And the movie? Who really cared that it was only a partial success (and a large part of that being Jack Nicholson) when everyone made such a killing?

When the party's over

Bathype did have one positive effect, along the way the message gradually became *Comics Are Coming* New comics for a new age Some serious fun

Fleetway publishers of *2000 AD* were first off the mark with *Crisis* but this was about as hip as *The Tin Machine* until the introduction of Milligan/McCarthy's *Skin* As far as the UK went, the year really went to *Deadline* with its electric mix of girls, guns and kind hearts The world's first dance comic, brought us *Tank Girl* and a host of original, young, cartoonists that literally exploded off the page

We might also have traced a little of the *Crisis* Band Aids, in Alan Moore and Bill Sinkiewicz's *Brought To Light*, except this was a harrowing tale that counted the cost of American foreign policy in swimming pools of blood Definitely a highlight of last year As was the first part of Moore's *From Hell* serialised in the horror anthology *Taboo* (Spider Baby Grafix) a scalpel-like examination of Ripper mythology

Other delights of last year were to be found in the resurgence of independent publishing in this country Like the independent record companies, these independents can go into unexplored areas with an enthusiasm and energy that big companies with their unwieldy corporate structures can't hope to match *Downside* a soap opera set in a future East End council estate, and *Velocity*, a withering satire drawn from the junk culture are but two to watch out for

On the other side of the pond, *Love and Rockets* (Fantagraphics Books) by Gilbert and Jame Hernandez, continued to lead the way with its gently surreal soaps set in the barrios of Los Angeles and the mythical Mexican village of Palomar Meanwhile America continued to snap up the best of British talent, Jamie Delano's *Hellblazer* (DC) drew its horror from the nightmare of the Thatcher decade and Kevin O'Neill and Pat Mill's *Marshal Law* (Epic) gave a final slashing to the rotten core of the superhero

The year ended on a high for me with the discovery of Munoz and Sampayo's *Sumer* (Fantagraphics Books), a comic that fuse Hollywood noire with 50's expressionism to examine the human heart.

1989, there was more to life than *Batman*

Stuart Green

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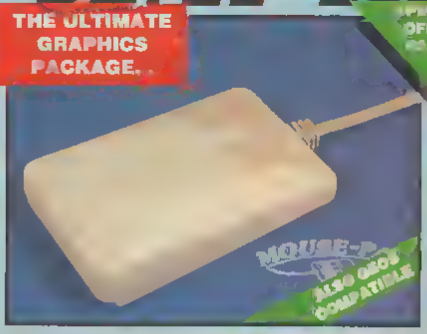

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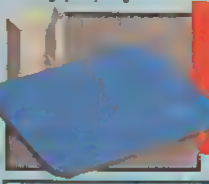

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I WANNA ROCK WITH YOU

Rik Henderson, the man with an enormous wobbly dictaphone, visits Britain's latest tourist attraction, the Rock Circus

It was the boozing, you see, that ruined old Baz's career. But when we were going strong in the charts, the parties were fantastic. Bob was there, so was Jimi, and Janis made a short appearance before we were all locked up. You should have seen the papers, oh how we chortled.

Unfortunately the imagination can get somewhat wild, and scenes like this live only in the mind of a humble journo, like myself. Bob Marley, Jimi Hendrix and Janis Joplin are sadly deceased, so to come face to face with them is something only Burke and Hare could do. Rock Circus, however, exists to rectify this fact, and allows you to come within breathing distance of exact replicas of gone, but not forgotten, stars.

Situated in the heart of the West End, the venue, which opened its doors on the 7th August 1989, is part of the Tussauds Group of tourist attractions (best known for their Madame Tussaud's and London Planetarium). And it is easy to see where the inspiration has stemmed from. It features many waxworks of the most famous of the rock stars, and could be likened to the Chamber of Horrors, with the genre being the major change.

Upon entrance visitors are supplied with headsets. These pieces of equipment allow wearers to hear only the sound emitting from the area designated to a particular exhibit. This is done via infra red signals that are picked up by the headset and converted into sound. Unfortunately this provokes one small problem which I discovered: if your headset is slightly off-line the beam will not be picked up, and therefore no sound will be heard. This is rectified by a small adjustment in head angle, so it's not a major worry.

Above and right: Jerry Lee Lewis and Art Garfunkel

Above Bob Marley, a true legend

It would be nigh-on impossible to include every influential rock star from the 40s-90s but Rock Circus has had specialist help from Paul Gambaccini in choosing the ones that would best represent the industry Some of the stand alone exhibits are very well thought-out indeed

In the centre of the lower floor (there being three floors in total) there is a large revolving stage with Elton John, Stevie Wonder and Little Richard, all playing pianos, and in the centre, at the end of the 7 minute show appears Elvis Presley in all his splendor (with hamburger filled stomach and all) And all around the edges, and on the second floor, are smaller scenes

It is the final show that is definitely the most worth seeing as it is situated in the largest revolving theatre in Europe, and it features audio animatronic figures (much like certain Group Editors) These are bionic figures that are controlled by a whapping great computer system Unfortunately, although the show is very good indeed (especially when the volume on your headset is turn up to full blast) the bionic stars sometimes act in a way not too dissimilar to a Gerry Anderson creation But all said and done, it is quite spooky to see models that move in time to music and in an elaborate way too

Not so much an education, not so much a feature of excitement, more a cross between the two Rock Circus cost £10 million to erect and can be yours for a few hours for only £4 20 (£3 15 for children and concessions) Worthwhile yes, revolutionary, probably!

The Rock Circus, London Pavilion, Piccadilly Circus, London (Opposite Eros)

Right: Elton John making a spectacle of himself


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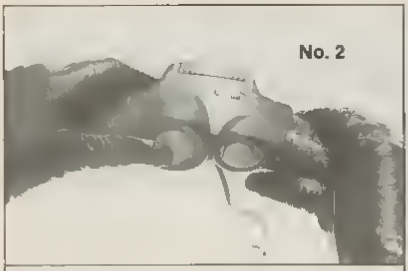


The Computer Industry Karma Sutra

And it doesn't even require batteries

Famous footballing megastar signs for computer magazine

A very famous soccer star has been transferred to a computer magazine in a sensational scoop. Sources have not yet revealed who he is or what magazine is involved but we know that it is in the position of Sales Executive.

By the way, YC has signed ex-Norwich city player Tony Flanagan as well!

THE END IS NIGH

In tha Limelight

On Thursday 28th December US Gold invited nigh on 700 journos and industry noticeables to the Limelight Club in aid of their 5th birthday. Rik Mayall was the guest of honour, and a mighty funny one he was too. But the night was made by the stunning dancing skills of Stuart 'Travolta' Cooke.

Journalists gasped in awe as his incredible strutting moves wiped the floor clean (not last because he had dusters strapped to his feet). Distributors oggled as he spun in time to the music. Software Houses slavered as he twisted his body into shapes only silly putty could imitate. Watch your neighbourhood dancefloor now for the funky cat Cooke may be appearing near you soon.

Press hard at work

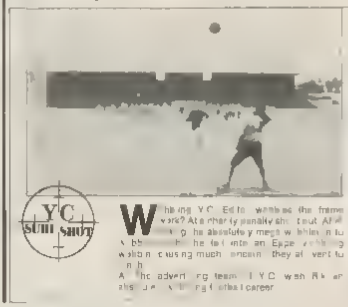
At the recent PC Show members of the press shocked many traders and companies by performing an act known as 'work'. After the five minutes were up though, it was a reassuring sight to see them huddled in the bar.

One of our sources revealed "We didn't know what had come over them. The Argus team suddenly descended upon us and demanded that we chat about 'business'. I can tell you now I was extremely frightened!"

We must stress to readers that this is not common amongst magazine staff and should not be assumed as representative of the industry.

It's a wobbler too

Those who enjoyed the half page on page 57 in last month's YC, will be pleased to note that several other World-beating Wordsmiths missed their penalties too. I really do not wish to be cruel by saying who, so I'll keep quiet for the sake of YC's advertisement manager and a certain publisher at Emap. It would be rather embarassing if anybody found out!



YC SUN SHOT

W[illegible] YC Ed to [illegible] the frame work? At a charity penalty shoot-out. All [illegible] he absolutely mega [illegible] he fell into an Espe[illegible] [illegible] much [illegible] they at vert [illegible] At the advertising team, YC wish Rik [illegible] [illegible] career.

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DEEK	INFO	TRACE
DELETE	KEY	UNNEW
DOKE	PAUSE	QUIT
DUMP	PLIST	MONITOR
FIND	BLOAD	BLOAD

RENUMBER [illegible]

PSET Set up of printer type

HARDCAT Print out Directory

The [illegible] commands [illegible] be used in your programs.

[illegible]

LOAD	SAVE	VERIFY
MERGE	AUDIO	

[illegible]

Also works in BANK, RAM, KERNAL and [illegible] areas.

A ASSEMBLE	INTERPRET	S SAVE
C COMPARE	J JUMP	T TRANSFER
D DIS-ASSEMBLE	L LOAD	V VERIFY
	M MEMORY	W WALK
F FILL	P PRINT	X EXIT
G GO	R REGISTER	$ DIRECTORY
H HUNT		DOS Commands

[illegible] POWER CARTRIDGE [illegible]

The Disk commands [illegible] your own programs.

DLOAD	DVERIFY	DIR
DSAVE	MERGE	DEVICE
DISK		

MERGE Two BASIC programs can be merged into one.

DISK With DISK you can send commands directly to your disk.

[illegible]

HARDCOPY [illegible]

[illegible] printers (MPS801, 802, 803 etc.) [illegible] Centronics printers (EPSON, STAR, CITIZEN, PANASONIC etc.) [illegible]

PSET 0	[illegible]
PSET 1	EPSON mode only
PSET 2	SMITH-CORONA mode
PSET 3	Turns the printing [illegible]
PSET 4	HARDCOPY setting MPS802 [illegible]
PSET B	Bit-image mode
PSET C	Setting Lower/Upper case and sending Control Codes
PSET T	All characters are printed in an unmodified state.
PSET U	Runs a Serial printer and leaves the User port available.
PSET Sx	Sets the Secondary address for HARDCOPY with Serial Bus
PSET L1	Adds a line-feed, CHR$ 10, after every line.
PSET L0	Switches PSET L1 off.

[illegible]

[illegible]

CONTINUE	[illegible]
BASIC	[illegible]
RESET	[illegible]
TOTAL BACKUP DISK	[illegible]
RESET ALL	[illegible]
TOTAL BACKUP TAPE	[illegible]
HARDCOPY	[illegible]
MONITOR	[illegible]

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